AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

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Volume 71 Number 22

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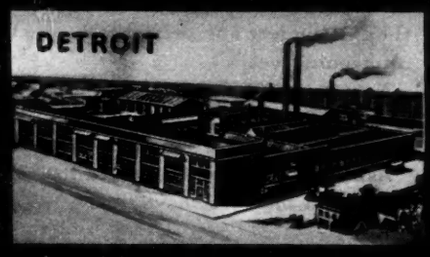

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AUTOMOTIVE INDUSTRIES

Vol. 71, No. 22 ▫ THIRTY-SIXTH YEAR ▫ December 1, 1934

2,800,000 Units Plus In 1934

Dec. Estimate 125,000; Dealers Exceeding Quotas

by Athel F. Denham
Detroit Editor, Automotive Industries

Production totals for the current year in the United States and Canada, will exceed 2,800,000 units by a comfortable margin judging from December manufacturing schedules which indicate a total in the last month of the year of approximately 125,000.

Of course, December schedules are quite flexible in that most companies will try to get out as many of the new models as possible to sample dealers before the first of the year at which time most of the announcements are planned. There will be some announcements, however, in December, including the new models of one of the largest manufacturers.

If present indications—dealers orders for new cars, etc., for instance—were to be taken as a criterion, 1935 should show a gain over the current year well in excess of the 15 to 20 per cent commonly anticipated by automotive executives. For the first time in many years dealers have been ordering new cars prior to announcement date in quantities far in excess of quotas in many cases. Many dealers visiting factories during the last week or so have expressed their belief that they will sell 50 to 100 per cent more cars in 1935 than in 1934.

Despite dealer optimism, so far factories have been cautious in scheduling production for next year. Individual factories have stated publicly that they anticipate large increases in 1935, but producers nevertheless are showing some hesitation in committing themselves to large increases in parts and material purchases at the present moment.

The 1934 estimate of total production compares with 1,985,981 in 1933, an increase of well over 40 per cent, and exceeding the output in any year since 1930 when some 3,500,000 units were produced. Truck production has increased during the year more than car output with the result that the number of commercial units built this year will be close to 600,000. This total is approximately equal to the 1930 total and is as large as the combined 1931 and 1932 truck totals.

Machine Tool Builders Plan 1935 Exposition

For the first time since the hectic days of 1929, the National Machine Tool Builders' Assn., will schedule another exposition. The next Machine Tool Exposition will be held in 1935 on Sept. 11 to 21. It will be staged at Convention Hall in Cleveland, the scene of the 1929 Exposition.

SAE Industrial Power Meeting, Chicago, Dec. 5

Representatives of the Milwaukee, Detroit, Chicago and Cleveland sections of the S.A.E. together with tractor, agricultural and industrial power specialists from all parts of the country will attend the two-day Tractor and Industrial-Power Equipment meeting of S.A.E. at the Stevens Hotel, Chicago, which opens Dec. 5. The meeting has been arranged by the Tractor and Industrial-Power Equipment Committee of the society.

Henderson-Lubin Conference Launches Inquiry into Automotive Employment

The first step of the investigation into employment conditions within the automotive industry, ordered by President Roosevelt, was taken early this week when Leon Henderson, chairman of the NRA Research and Planning Division, and David Lubin, chief of the Bureau of Labor Statistics, conferred upon the extent of the collaboration of their respective divisions. Objectively the investigation will seek to determine the possibilities of regularizing employment in the industry, and to that end the President, in his order to S. Clay Williams, NIRB chairman, stated that all federal agencies whose collaboration might be deemed desirable were to be called upon.

The NIRB will study the results of the investigation when complete and transmit to the President a summary of the report and the views of the board relative to the feasibility and methods of effectuating improved employment conditions.

In accordance with the President's wishes, representatives of the various economic interests involved, including labor, management and consumers, are to be given an opportunity to present orally, or in writing, their opinions and any supporting factual data. The President also gave assurance that no action would be taken "until ample opportunity has been given to interested parties to review the results of this study and to present their views on the questions involved."

Up to the time of going to press, it is understood car makers had not yet received any indication of the part, if any, they are to play in the investigation.

(*Turn to page 666 please*)

U.S.C.C. Committee Studies Vehicles Sizes — Weights

A committee of the board of directors of the United States Chamber of Commerce has been authorized to determine the procedure to be followed in dealing with the question of sizes and weights of highway vehicles which has been under study by the Chamber.

No Rule on Unit of Representation Set By NLRB in Houde Case, Richberg Says

The flexibility of code making should be preserved in any legislation adopted in place of the emergency National Industrial Recovery Act, Donald Richberg, executive director of the National Emergency Council, said last week in an outstanding speech before the Associated Grocery Manufacturers of America.

One of the important features of the speech was a discussion of Section 7a and the scope of the Houde decision. In connection with the latter he pointed out that the NLRB decision said "This opinion lays down no rule as to what should constitute the proper unit as the basis of representation." Continuing he emphasized that under the law "the proper unit which is the basis of representation must be a unit of organization selected by the employees themselves. No one has been given the authority under the law, and I doubt whether anyone could be given legally the authority to herd all the employees, or any number of employees, into a voting unit and then to compel them to select their representatives by a majority vote. The right of self-organization certainly includes the right of each man to decide for himself with what man he desires to be associated."

Although Mr. Richberg was expressing his own views, his reference to 30-hr. week proposals were taken as reflecting the present administration attitude on this important subject. To illustrate the need for flexibility in code-making, he said "Apply, for example, the experience of NRA in considering the effect of reducing all hours of work to a fixed number and requiring an increase in rates of pay to provide for the maintenance of daily earnings. According to such a rule, labor costs might be increased in one industry, or in one shop 10 per cent, and in another 50 per cent. The individual worker would earn no more money; but theoretically more workers would be employed. In practical result, however, a general increase of labor costs is likely to dislocate large numbers of workers through transferring production from individual plants and industries to their competitors, or by increasing greatly the advantages of highly mechanized industries over their competitors . . . those who believe devoutly in freedom of contract, collective bargaining and fair competition should hesitate long before devising legislative control of their affairs."

Discussing trade practices, Mr. Richberg said " . . . in the twilight zone between dishonesty and legitimate competition, trade and industry should seek first to establish an accepted standard of unfairness before writing—mandatory requirements in a code. Enforcement must fail where there is no general agreement that a law should be enforced."

Esso Ready to Market New Grade of Gasoline

Esso Marketers, the group of oil companies handling Esso Petroleum products, has developed a new grade of aviation gasoline — Aerotype Esso — a premium gasoline which replaces Esso.

The most important characteristic of this gasoline is its high volatility as evidenced by the following distillation data—23 per cent evaporated at 158 deg. Fahr.; 58 per cent evap. at 212 deg. Fahr.; 83 per cent evap. at 257; 90 per cent at 284; completely vaporized at 320. Next is the increased octane rating which is now a minimum octane number of 78 as compared with the existing standard of 76.

The third feature is chemical stability and freedom from gumming. This new fuel is rated as having an average of one mgm. of gum normally, and will never exceed three mgm. gum even after long storage. The fuel also contains a small percentage of a special solvent oil which is said to dissolve gum and carbon, thereby freeing piston rings and valves as well as reducing the effect of carbon deposits on the piston and cylinder head.

Apart from the feature of easy starting and rapid warming up, Esso Marketers claim that this fuel will prevent detonation in any engine on the road today.

Geschelin to Read Paper At ASME Annual Meeting

A comprehensive discussion of surface broaching in automotive production will be given by Joseph Geschelin, Engineering Editor, *Automotive Industries*, in a paper entitled "Current Practice in Surface Broaching" to be delivered before the machine shop practice division of the ASME at the society's annual meeting next week in New York. Mr. Geschelin's paper is published in full in Section 1 of the November *ASME Transactions*.

Good Foremen Minimize Labor Trouble — Knudsen

Stating that the foundation of labor difficulties in plants are of an individual rather than a collective nature, W. S. Knudsen, executive vice-president of General Motors, in addressing 50 Olds and Fisher Body plant supervisors in Lansing this week, maintained that plants having the best foremen and the best supervision have the least trouble.

"The corporation, and you and I, are perfectly willing to bargain collectively with our employees on a proper basis of equity," Mr. Knudsen stated in amplification of a remark that collective bargaining was coming into its own. Explaining what constitutes an equitable basis, he said that the initial relations are duties of foremen and superintendents.

"What was known as individual bargaining is now collective bargaining by law," Mr. Knudsen continued. "I cannot help but feel that under all this technical talk of bargaining lies the old principle of being fair and on the level."

Big Motor Car Order

Warner Gear Company has been awarded a contract for 1935 on transmissions and transmission parts from one of the largest motor car companies, which formerly manufactured its own transmissions.

October Sales Close to September

	October 1934	September, 1934	October, 1933
Auburn	651	641	292
Austin	61	19	257
Buick	5,160	4,566	2,639
Cadillac	330	271	286
Chevrolet	38,076	43,003	44,055
Chrysler	2,841	2,195	2,531
Continental	7	4	510
DeSoto	967	934	2,005
Dodge	6,918	5,894	8,563
Ford	38,641	41,929	29,047
Franklin	5	6	100
Graham	1,003	865	752
Hudson	1,524	1,247	194
Hupmobile	616	572	508
LaFayette	1,066	1,038	....
LaSalle	374	370	332
Lincoln	182	171	162
Nash	1,132	907	460
Oldsmobile	6,332	6,313	2,824
Packard	635	555	893
Pierce-Arrow	90	103	252
Plymouth	22,240	24,551	25,454
Pontiac	4,891	4,697	6,976
Reo	310	289	437
Studebaker	3,093	2,554	2,364
Terraplane	3,293	2,642	3,299
Willys	420	562	1,035
Miscellaneous	22	33	99
Total	140,880	146,931	136,326

"We are very hopeful and optimistic about business conditions . . . and I hear favorable reports from all over the country," Edsel Ford said in an interview prior to meeting President Roosevelt at Warm Springs, Ga. In response to a question, he also stated "We have not signed an NRA Compliance Certificate, and we have no intention of doing so." In the above photograph are (left to right) R. Marvin McIntyre, secretary to President Roosevelt; Mrs. Edsel Ford, Lynn Pearson of Detroit, and Mr. Ford. The picture was made on the golf links at the Georgia spa.

AFL Holds "Fence Mending" Meeting in Detroit Prior to Drive for Members

Some 200 officers of the various automotive locals in the Detroit area, including such localities as Cleveland, Flint, Lansing, etc., were called together Monday night by Francis J. Dillon, Chief Organizer, A. F. of L., to report on present status of their locals before the association's district council, preparatory to launching of a new organization drive.

In addition to these reports, addresses were made by Mr. Dillon, and F. X. Martel, president of the Detroit Federation of Labor. • The various reports were all more or less of the same tenor—active membership in the locals had fallen off materially with the advent of lay-offs, requiring re-organization work as production gets under way again. Under the new A. F. of L. dues set-up of course, all members remain in good standing during lay-off periods without the payments of dues during that period, but when they return to work it will be necessary to get them to resume payments.

Apparently the major brunt of organization work for the immediate future is placed on the shoulders of officers and members of the separate locals, central office organization work on a large scale being postponed until production gets under way in greater quantities.

Mr. Martel, who apparently has made his peace again with the United Automobile Workers International mentioned present plans of industry to stabilize employment by staggering of new model announcements. He pointed out that such

(*Turn to page 666, please*)

Defer Action on RR Rate Increase Plea

Marvin Points Out Rise May Cut Revenue; Traffic Managers Meet in Detroit

Final decision on the position the automotive industry will take on the railroads' petition for increased freight rates was deferred until a later date by the traffic managers of AMA member companies meeting last week in Detroit.

Discussing the petition J. S. Marvin, assistant general manager of AMA, and chairman of the conference, said the question in the present case is whether the proposal of the railroads, made to the Interstate Commerce Commission, would actually bring the increased earnings estimated. He added that cost is the controlling factor in selecting the method of transportation.

"As we see it," Mr. Marvin said, "any increase in the cost of rail shipping will be subject to a survey from this viewpoint, and in the absence of readjustments to meet particular situations, could indicate a departure from rail shipping. This might mean that the railroads' forecast of additional earnings would not materialize. They have estimated the additional amounts to be derived from shipments of passenger automobiles, trucks and knocked down automobiles through the proposed increase in their rates at $3,409,901."

Mr. Marvin also said there was general opposition to the railroads' proposal to make a charge of one dollar for each order bill of lading issued. This, he said, was not an increase of present rates, but a new charge not heretofore made. It was pointed out that the industry easily could adjust its procedure to avoid the use of order bills of lading which, it is said, are a protection to railroads against improper delivery of shipments by freight agents.

The matter is being handled by a special committee headed by C. R. Scharff, Chevrolet; F. A. Allen, Hudson; J. M. Myler, Chrysler; R. L. Reese, Buick; G. M. Sherman, Studebaker, and W. H. Lougheed, Graham-Paige.

There was a joint conference of railroad claim agents and the automobile traffic directors the same day. This meeting was presided over by G. F. Wheeler, of the Michigan Central.

Traffic men at the meeting were:

V. Laird, Auburn; R. L. Reese, Buick; E. J. Tiedeman, Cadillac; C. R. Scharff and E. F. Stewart, Chevrolet; J. H. Myler, Chrysler; N. D. Hoke, Dodge; C. A. Sullivan, General Motors; W. H. Lougheed, Graham-Paige; F. A. Allen, Hudson; R. E. Watson, Hupp; E. B. Rogers, Pontiac; D. C. Whitmore, Olds; J. J. Crimmins, Studebaker; K. A. Moore, Auto Mfrs. Assn.

Davis Recommends Drastic Changes In NRA Procedure In Enforcement Report

Code provisions whose merit and public acceptance have not been developed, and whose legal and economic justification has not been established by the Federal Trade Commission or court decisions, should not be so enforced as to arrest public support for the NRA code program, William H. Davis, formerly NRA compliance director and now special advisor on compliance and enforcement, advised the National Industrial Recovery Board in a report made last week on the enforcement problem.

Although Mr. Davis did not give any direct indication of what specific kinds of code provisions he had in mind in making this recommendation, in some quarters it is felt that he was referring particularly to rules regulating prices and production. Since some other suggestions made in the report have already been put into effect, there is some opinion that this particular recommendation means that efforts to secure compliance with code provisions coming within Mr. Davis' definition in the future is likely to be more largely persuasive—at least until they have a greater degree of legal and public acceptance than at present.

The report as a whole is still under consideration by the Board and was made public simply to stimulate discussion that would aid in determining basic NRA policies. Separate handling of labor and trade practice provisions was recommended with the government, either directly or by supervision, assuming responsibility for enforcement on wages and hours, and code authorities assuming primary responsibility for compliance with trade practices.

A significant statement, which some regard as a blow at Blue Eagle boycott enforcement, is contained in the final paragraph of the report, which says:

"It is fundamentally important that the country should understand that NRA code enforcement is going to be conducted within the law; that it will be carried on in accordance with the temper of our people along the well trodden paths of constitutional procedure."

Mr. Davis would have the labor compliance machinery of the Compliance Division gradually developed into a single duty, regional code labor enforcement service, which would function primarily in industries having no labor compliance agencies of their own. It would handle only wage and hour matters, leaving 7a to the National Labor Relations Board. However, it would be available to NLRB and industrial labor boards for investigation and fact-finding. In this connection, as reported elsewhere in this issue, NRA has already moved to decentralize its compliance machinery into ten regional divisions.

The report proposes separation of trade practice provisions of the code into three classes:

1. Those which by public acceptance, industry practice and court decisions have already become established, such as prohibitions of misrepresentation, bribery, hidden rebates, etc. These should be enforced directly in the courts.

2. Those which prohibit practices not commonly established and recognized as unfair, or on which there is neither common agreement nor court precedent. They should not be so enforced as to arrest public support of the code program until and unless their merit and public acceptance is developed, and their legal and economic justification is established by the Federal Trade Commission or court decisions.

3. Those which experience has shown to be unenforceable or economically unwise. They should be dropped by code revision.

It is Mr. Davis' conception that all Class 2 provisions would gradually pass into either Class 1 or Class 3 but he did not undertake to specify which groups of code provisions now fall into Classes 2 and 3. He will soon begin a study of specific code groups.

Oct. Labor Turn-Over Increases in Car Plants

The net labor turn-over in automobile factories for October, according to the Bureau of Labor Statistics, Department of Labor, showed an increase of 2.18 per cent over September, and a decrease of 0.89 from October of 1933. The figures are based on the net turn-over rates per 100 employees and show 5.31 for October against 2.53 per cent for September and 6.20 per cent for October a year ago.

Decreases were registered in the lay-off and total separation rates. For the former the average was 12.31 per cent for last month against 13.31 per cent in September and 14.28 per cent for October of last year; the total separation rate was 13 per cent last month compared with 14.04 in September and 17.31 during the corresponding month last year. The number of workers who quit their jobs likewise was less last month, 0.53 per cent against 0.59 for the preceding month and 1.69 for October, 1933.

Railroads Seek the Black at Expense of Shippers

A further rise in railroad rates on top of the $170,000,000 increase which has already been requested of the Interstate Commerce Commission, railroad spokesmen anticipate, if the next Congress passes a bill regulating truck and water competition.

Speaking recently before the Investment Bankers Association, Fairman R. Dick, advisor on finance and credit to the Association of American Railroads,

The family car will thus appear
Quite early in the coming year
If tax mad governments persist
In adding taxes to the list.

Of those already on the pile
That tax the motor's every mile
For every tooting of the horn
Some new tax burden must be borne.

Courtesy, New York Evening Journal.

said: "An application for an increase totaling $170,000,000 is now before the Commission. . . . This increase can be made larger, however, if the bill to regulate trucks and waterways is passed in the next Cogress. Mr. Eastman has already drawn the bill, and if it becomes law, it should prove possible to pass on to the shipping public whatever burden seems necessary in order to restore a safe margin of profit."

Automotive Demands Expand Steel Output

Believe Check-Up Will Show Nov.-Dec. Business Better Than Seasonal

Specifications coming to finishing mills from automobile manufacturers and parts makers made possible further expansion of operations in the steel industry this week. The most impressive gains have been made in the Cleveland and Youngstown districts, quite a few units now employing better than two-fifths of their capacity.

The American Iron and Steel Institute reports ingot output this week at 28.1 per cent of capacity, compared with 27.6 per cent last week. Virtually all of the automotive releases are for shipment in December. There having been no change in prices, transition from the billing of fourth quarter business to that of first quarter 1935 will be merely a formality, and little sleep is lost over how much of the steel shipped in December is intended for 1935 use.

The interval between the time, when steel is shipped by the mills and when the parts into which it is shaped are assembled into the finished unit, has been whittled down so impressively that automotive buyers have gotten out of the habit of anticipating their steel requirements by more than a few weeks at the most. According to the latest reports of the National Association of Flat Rolled Steel Manufacturers, October sales exceeded 100,000 tons, compared with 75,000 tons in the preceding month. Output in October was 105,000 tons, compared with 76,000 tons in September. Compared with October 1933, when output was 146,000 tons and shipments 175,000 tons, production last month was much lighter than in the corresponding period of the preceding year, but on the other hand October, 1933 sales amounted to only 79,000 tons. All of which would seem to corroborate statistically the impression generally held in the steel market that demand, compared with last year, is belated, but that, when the record for November and December is in, both months will be found to have yielded much more business than is normally looked for in this off-period of the year.

Pig Iron—All base prices for pig iron for shipment over the first quarter of next year have been reaffirmed, becoming effective Dec. 1. A slight flurry in the scrap market, believed to be largely due to the publicity given to shipments to Japan, has been without effect on the pig iron situation.

Aluminum—Conditions in the primary as well as secondary markets are entirely unchanged. Automotive demand for piston metal is on the uptrend.

Copper—Domestic consumption continues light. The market reflects, however, a somewhat firmer undertone. In some quarters this is ascribed to better speculative interest in copper on the London Metal Exchange where traders are reported to have switched from tin to copper.

Tin—An anaouncement by the New York office of the International Tin Research and Developmet Council states that production quotas during the first quarter of 1935 would remain unchanged. This has made for steadiness, spot Straits opening on Monday at 51.30 cents, but little changed from last week's close.

Lead—Large tonnages of lead were contracted for at the attractive price levels quoted early this week.

Annual Automotive Wages Compare Favorably With Other Industries

Recently critics of the drastic seasonal variation which the public's buying habits cause in automotive employment, have stressed that high hourly or daily wage rates are of no real importance unless the worker labors enough days or hours yearly to provide him with an adequate annual income. Specifically in this connection it has been charged that average annual earnings in the industry, despite relatively high wage rates, are only $900.

Unfortunately available official statistics do not throw all the light on this question which might be desired and it is to be hoped that the investigation of the subject ordered by the President will fill this deficiency. However, Bureau of Labor statistics do provide some interesting evidence of how the automotive industry stacks up with other manufacturing industries on the score of average annual wages.

Here, together with some derived data, is what they show for the twelve-month period ending with last September:

INDEX NUMBERS
(1923-1925 = 100)

	Automotive	*All Manufacturing Industries*
Employment	90	79
Payrolls	72	61
Pay per worker*	80	77
Cost of living	79	79
Real wages*	101	97

*Derived

Unfortunately there are no data indicating how average annual earnings in the automotive industry in the 1923-1925 period compared with average annual earnings in all manufacturing industries. It seems reasonable to assume, however, that automotive earnings in the base period were at least as high as in industry generally.

If this assumption is accepted and if the government statistics used in the foregoing table accurately reflect conditions in the twelve-month period ending with last September, it would appear that:

Despite drastic fluctuations in automotive employment occasioned by the seasonal characteristics of the market, the average automotive worker fared four per cent (80 ÷ 77) better in annual earnings than did his brothers in manufacturing industries generally.

In real wages, the average automotive worker earned one per cent more than in the base period (1923-1925 average) while the average worker in industry generally had annual earnings that were three per cent less than in the base period.

The figures, of course, give no measure of the adequacy of annual earnings in the automotive industry or in industry generally. But they do raise a question as to why, if criticism on this score is justified, the automotive industry should be singled out for attack.—D. B.

International Aircraft to Resume Operations

Reorganization of the International Aircraft Corp. of Niles, Mich., has been announced by C. Duke Muller, who has assumed complete charge of the plant. Production of planes is to be resumed and negotiations have been completed for adding many technically trained workers.

The Horizons of B

Inflation and Management

As a practical matter, what should an automotive manufacturer do to meet the threat of inflation? How shall he adapt himself in advance to the higher price levels which the experimental impulses of the inflationists, the budgetary deficits of the government and the vast outlays for relief and public works may entail? The answer is, "Nothing at all."

This does not, we hasten to add, indicate a belief that the country will have no inflation. It simply means that the extent of any price rise now in prospect within the early future as a result of inflationary activity is not sufficiently great to justify any special preparations in compensation. The question is not "Will we have inflation?" but rather "How much inflation will we have?"

Normal Price Recovery

One way of approaching this problem is to determine the amount of price recovery which we could reasonably expect with a normal revival of business, assuming that prices received neither stimulus nor check from the government. As stated in the last article on this subject, the ability to expand or contract the credit structure of the country rests largely with the banks, and the conduct of the banks in turn depends upon the course of business. If the opportunities for the profitable use of bank funds abound, loans will expand, deposits will move forward in the same manner, the rate at which deposits turn over will likewise rise, and we shall have an increase in the authentic supply of money.

In comparison with this movement, either forward or backward under the joint impulses of business and banking, the issue of three or five or ten billion of currency has a significance which has been greatly exaggerated. The psychological effect of such an emission of currency by the government is difficult to predict. As a matter of pure monetary and price mechanics, however, its effect would be considerably less than that which would follow a natural revival of business.

Gigantic Impulses Required

The matter may be stated quantitatively, using rough, round figures, in the following manner. Deposits in all the reporting banks of the country in 1929 averaged an aggregate of 57 billion. The bottom of the depression found these deposits shrunk by at least 20 billion. This was the essence of deflation. It was not the direct consequence of government policy. If business were left to its own devices and were able to reacquire confidence in the future, this loss of 20 billion might well be recovered within a comparatively short period of time. During the course of this process it is doubtful if any serious agitation about the consequences of inflation would be discovered. Yet so far as the mechanics of credit and prices go it matters little whether the increase takes place as a result of the natural expansion of bank credit responding to business or to inflationary expenditures by the government.

In fact it is quite possible to present a creditable brief proving that an expansion of credit resulting from government policy will have less effect upon the price structure than a corresponding expansion resulting from private impulses. Government expansion would intimidate capital and induce it to flee the country in substantial quantities. The process would cause the dollar to drop in the foreign exchanges and might seem at first hand to aggravate the inflationary movement. This, however, would be more than offset by the check upon capital initiative at home.

Real Sources of Inflation

The progress of inflation depends to a large degree upon the inclination of business men to make desirable changes in plant equipment. It depends similarly upon the enthusiasm of promoters who have new projects, confidence in which would be seriously affected by a general flight of capital. While certain stocks would rise under the more sensational incentive of government inflation, bonds in general would suffer. By and large, the most effective and indeed the only salutary form of price recovery (inflation) is that which results from the revived confidence of business men in their profit prospects and the expansion of bank credit which follows.

Federal Debt and Inflation

Quantitatively, an increase of 20 billion in bank credit, restoring deposits to the 1929 total would occasion no concern. The accompanying increase in price is not the type which would cause extended apprehension of inflation in advance or the discussion of protective measures by the business man and the investor.

The debt of the federal government has increased approximately 13 billion during the depression. It is doubtful if an additional increase of equal amount taking place during the next two or three years would have an effect upon the price structure equal to that which would follow an expansion of loans of similar amount for business purposes. Assume, how-

Business

by Joseph Stagg Lawrence

ever, that the final effect of such government expenditure would be similar to a corresponding expansion of private loans and that 20 billions of added government debt had the same power in restoring prices that the decline of that amount in bank deposits seemed to have on prices in the other direction. In other words, we assume that an increase of a billion in the government debt is accompanied by a rise in prices equal to the decline which accompanied a drop of a billion in bank deposits during the depression. On this basis the increase of 20 billions in debt would restore the general price level prevailing in 1929. It is difficult to see how such an eventuality is one which should induce a business man today to go to any extraordinary lengths in providing compensating safeguards.

Comparison With War Inflation

There is another approach to this problem. This country had an experience in inflation during the war. It did not compare with that which occurred in Germany and other war ridden countries, but all the doctors recognized it as a clear case of monetary malady. It was the result of an increase in the government debt of approximately 25 billion. This accompanied an extraordinary consumption of commodities and an artificial scarcity of labor. Thus on one side of our price equation we have a substantial increase in the media of exchange and on the other and equally substantial decline in the goods and services for which the media is offered. The supply of money was increasing at the same time that the supply of things which money could buy was diminishing. As a result of this concurrence of price forces there was a total rise in the price level from the average level of 1914 to the peak in May, 1920, amounting to 150 per cent. While this rise was not uniformly distributed over this six-year period, it averaged about 25 per cent a year in terms of the 1914 base.

Lack of Similarity With War Experience

The observer will note that the present situation differs from the war period in at least two important circumstances. There is no scarcity of goods and certainly no scarcity of labor. It is true that the government is attempting to achieve such scarcity through its AAA program, aided this year by the drought. Similarly, labor through its shorter hours is attempting to curtail the supply of services. Patently neither effort can approach the war in effectiveness.

Many of the commodities whose price inflationists hope to raise are the objects of an inelastic demand, i. e., a demand which does not respond readily to changes in price. It is doubtful, for example, if the consumption of bread would change materially if its price were cut in half or if the supply of buying power were doubled. This statement does not apply to automobiles, and it is safe to say that automobiles will benefit far more from any general increase in monetary income than will wheat. The point we make is that one of the elements necessary even to such a rate of inflation as we experienced during the war is lacking, namely, a scarcity of goods.

To Get War Inflation

However, assuming that the only difference were a matter of currency and bank credit, it is certain that an increase of 25 billion in the government debt could not have the same proportionate effect upon the total supply of bank credit available for circulation. It might conceivably be necessary to raise the national debt 50 billion in order to create an increase in bank credit corresponding to the war increase. Even then the correlative decline in the supply of commodities would be lacking.

How obdurately prices resist all artificial efforts to raise them may be noted from the index of wholesale prices maintained by the Bureau of Labor Satistics. This covers 784 commodities. The weighted average price of this group was 71.2 per cent of the 1926 level in October, 1932. Last month the figure was 76.5 per cent. Again it is difficult to say how much of this increase was due to fortuitous natural causes, how much to higher code prices and how much to purely monetary factors. If the heoric efforts of the past 12 months to raise prices has added 5.2 points to the wholesale averages, how much effort would be required to raise them to the 1926 or the war level?

It seems to this commentator that the artificial monetary and credit impulses necessary to restore the 1926 level exceed anything which even the wildest inflationist in the New Congress contemplates. Until the evidence that such extreme measures are contemplated becomes more tangible it would seem that any inflation of the type which requires substantial adjustments in anticipation is not immediately probable.

This is not to be construed as an extenuation of excessive government spending, of gold and silver manipulation, of currency emissions, of pressure upon banks to lend where no sound basis for lending exists, of mounting government debts or any of the other stigmata of controlled recovery. It is simply an opinion that business men and investors will do well to keep their shirts on.

Chrysler Creates 14 Zones in New Set-Up

Combination of field sales activitites for Plymouth, DeSoto and Chrysler has resulted in the establishment of fourteen sales zones, of which four are in the eastern territory under direction of J. W. Frazer, and five each in the western and central districts under the direction respectively of C. L. Jacobson and L. G. Peed.

Sales zones are in charge of the following men:

Atlanta: L. J. Hannah, formerly Detroit DeSoto district manager.

Boston: S. W. Munroe, formerly director of Chrysler sales for Chrysler Sales Corp.

Chicago: S. D. Briggs, formerly director Plymouth sales for Chrysler Sales Corp.

Cincinnati: J. S. Boyd, formerly director of districts for DeSoto.

Dallas: F. D. Peabody, formerly Dallas district manager for Chrysler.

Detroit: E. B. Wilson, formerly Detroit district manager for Chrysler.

Kansas City: H. H. Herr, formerly Boston district manager for Chrysler.

Los Angeles: J. V. Orr, formerly with the Chrysler California plant.

Minneapolis: W. R. Morse, formerly Plymouth regional manager in Chicago.

New York: R. W. Rowland, formerly assistant general sales manager for DeSoto.

Omaha: Walter Evans, formerly DeSoto district manager at Cincinnati.

Philadelphia: Fred Hunt, formerly DeSoto district manager in Philadelphia.

Pittsburgh: R. L. Irwin, formerly New York regional manager for Plymouth.

St. Louis: Ross Williams, formerly Plymouth supervisor for DeSoto.

The new set-up, of course, does not handle field activities in connection with Dodge or Plymouth cars sold by Dodge dealers, these coming under the regular Dodge field force.

Move Durant Parts Business to Detroit

The entire stock of the Durant Motor Car Co. will be moved from the plant at Lansing to a new plant at Detroit, according to Milo Young, company manager. The firm has been manufacturing parts for Durant and Star cars at the old Durant plant ever since the old company went into receivership.

Mr. Young said his firm had purchased the entire stock of Durant and Star parts of the National Parts Co. The entire personnel of the firm, including 11 persons, will move with the concern from Lansing to Detroit.

Borg-Warner Pays Extra 25¢

An extra dividend of 25 cents per share on the common stock has been voted by Borg-Warner directors in conjunction with the regular 25 cent dividend, and the $1.75 per share payment on the preferred stock. All dividends are payable Jan. 2, to stockholders of record as of Dec. 14.

N. Y. Dealers Oppose Proposed Sales Tax

The proposed New York City two per cent sales tax, backed by Mayor LaGuardia, is being opposed by the Automobile Merchants Association of New York, Inc. The association estimates that the tax on new car sales alone would amount to $1,100,000 annually.

Henderson-Lubin Conference

(*Continued from page* 659)

Originally the study was ordered by Mr. Roosevelt when he renewed the automobile code without change until Feb. 1.

So far as is known at the present time neither labor's nor manufacturers' representatives have been informed of any arrangements for a conference with the President at the White House following his return from Warm Springs, Ga. But at the time he extended the code President Roosevelt intimated that he wished and would make himself available for such a conference. The President's most recent order dealing with the investigation followed a statement by Mr. Williams at a press conference that he did not understand that the President's extension order contemplated any work on the part of NRA.

AFL Holds Meeting Prior to Drive for Members

(*Continued from page* 661)

stabilization obviously would result in fewer men employed by the industry at its peak, but that such stabilization would lead to greater continuity of employment for those who remain associated with the industry.

Mr. Dillon confined his remarks largely to the question of necessity for organization work.

"Not until you are fully organized can you obtain a hearing from automotive executives," he said, adding: "When you reach that point those who are refusing to deal with you today will have to deal with you—or there won't be any more automobiles built."

At the council meeting a committee was appointed to draft "needed changes in compensation laws of Michigan" to be presented at the coming session of the legislature.

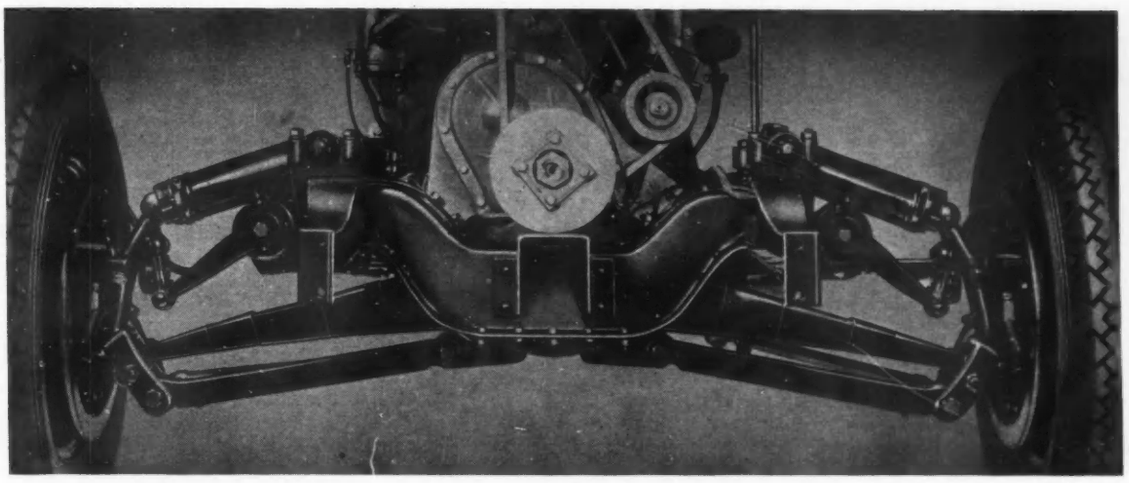
Wilson Foundry Resumes

Work in the foundry division of the Wilson Foundry & Machine Co. plant at Pontiac was resumed this week. Present plans call for the ultimate employment of about 300 men. With the Willys-Overland in production on 15,000 cars, allowed under the recent Federal court order, operation of the Wilson plant was necessitated inasmuch as W-O engines are built in the Pontiac foundry.

Louis L. Kelsay

Louis L. Kelsay, 45, of Dallas, Texas, Southwestern representative for Borg-Warner Service Parts Company, was killed Nov. 25, when his automobile slid on a wet pavement, crashing into a cement bridge. The accident occurred about 100 miles East of Dallas, while he and two automotive parts jobber companions were returning from the Automotive Service Industries Show. His widow survives.

Pontiac's 1935 plans please field men. From left to right they are R. H. Fussell, N. E. Perry, C. C. Redding, M. C. Thompson, A. C. Tiedemann, Jr., Miles Lilly, G. B. Albrecht and H. H. Grothjan.



Studebaker's New Independent Suspension

Offered on all 1935 models, this suspension is featured by a relatively soft transverse leaf spring. The lower link is of the wishbone type while the upper link is a tube. A complete description of these new cars begins on page 672 of this issue

NRA Officers Drafting 40-Hr. Week Proposal

Viewing the American Federation of Labor's demand for a 30-hour maximum work week as impossible of accomplishment without raising prices to a point where consumption would be seriously curtailed, NRA supervisors of approximately 400 basic and supplementary codes are now drafting a recommendation for a 40-hour week. It is understood the recommendation, which will include a survey of wages and hours, is being carried out under orders from the Recovery Board.

When the recommendation is in final form it presumably will be presented to the Recovery Board for consideration and approval. However, it is understood that the eventual destination of the proposal is the White House, where it will be available to President Roosevelt in his dealings with Congress on whatever work-week moves that body might make.

There are some indications present in Washington that some of the NRA officers engaged in the work feel that a 36-hour week would be more desirable as an employment aid. On the other hand, however, is being weighed the possible disruption such a maximum work hour rule might cause to industrial schedules which are largely predicated upon eight hour shifts.

Oct. Employment Gains Over Sept. in Michigan

Employment in the automobile industry in Michigan during October totaled 124,071 compared with 131,713 in September and 88,910 in October, 1933. These figures are based on reports of 92 companies and are compiled by the State Department of Labor and Industry.

Aggregate weekly payrolls were $2,570,272 in October, $3,285,668 in September and $1,791,961 in October last year. Average weekly earnings per capita were $20.72 in October, $24.94 in September and $20.15 in October, 1933.

Another Pierce-Arrow Reorganization Plan Up

Plans for an independent reorganization of Pierce-Arrow involving the raising of $900,000 new capital have been approved by a group of Buffalo business men headed by S. B. Botsford, executive vice-president of the Buffalo Chamber of Commerce according to reports current last week. It also is understood that A. J. Chanter, Pierce-Arrow chairman has approved the plans.

It is understood Mr. Chanter has placed minimum production at 1500 cars per year for the American market, with the plant operating profitably on 1770 cars. Current rumors say speed in consummating the plan inasmuch as court sanction must be granted by Monday, Dec. 3.

Hudson Tests Completed

Final road and laboratory tests have now been completed on the 1935 Terraplane and Hudson models and cars will soon be coming off the assembly line at the Hudson plant.

Decentralized NRA Field Force, Regional Offices Created in Enforcement Move

Immediate decentralization of the entire NRA field force and the establishment of 10 regional offices, have been authorized to get more energetic enforcement, primarily of hour and wage provisions, and better general code administration. The reorganization is in accord with recommendations made last week by William H. Davis, special advisor on compliance and enforcement, and former NRA compliance director.

Sol Rosenblatt, formerly in charge of the motion picture code, has been named director of field administration and enforcement and will head up the new program. He has been given wide new powers by the NIRB, including coordination of the compliance and litigation divisions of NRA with Department of Justice and Federal Trade Commission.

Existing state and local agencies of NRA will be continued, but when they are unable to adjust a case, it will be referred to the regional director, instead of to Washington as heretofore, for final action. The regional director is authorized either to settle the case or to turn it over to a regional council of three, one representing industry, another labor and the chairman being an attorney of the NRA litigation division. In each regional director's office there will be an NRA litigation specialist who will work with the local district attorney to secure active prosecution of court cases. Giving final authority to regional directors, thus taking compliance out of Washington, and the addition of the specialist to push court cases, are intended to speed up compliance.

Automotive Work and Wages Lag Output Decline

	Oct.,1934	Index Numbers (1923-1925 = 100) Sept., 1934	Oct., 1933
Adjusted for seasonal			
Production	41	51	45
Employment	81	82	70
Unadjusted for seasonal			
Production	38	56	40
Employment	75	81	64
Payrolls	49	54	46
Pay per worker	65	67	72
Pay per car	129	96	115
Employment per car	197	145	160

October Adjusted Index Shows Sales Above Sept.

An increase after adjustment for seasonal variation of about nine per cent in the value of retail sales of new passenger cars from September to October is reported by the Bureau of Foreign and Domestic Commerce on the basis of the preliminary figures of the value of these sales. Allowance is made in the index for the number of days as well as the customary seasonal movements. October's index stood at 58 on the basis of the 1929-1931 average as 100. This figure compares with 53 for the previous month, and 56 in August. Apparently no allowance was made, however, for the clean-up price reductions in effect on many lines in October.

Conversely the actual value of October sales, without seasonal adjustment, declined approximately 10 per cent from September; however, last month's sales were nine per cent greater than the corresponding month of 1933, and 109 per cent above those of October, 1932. In the aggregate the value for the first 10 months of this year was 33 per cent above that of the January-October period of last year and 60 per cent greater than that for the same months of 1932.

Ship 18 Carloads of Chevrolets to England

Eighteen carloads of Canadian manufactured Chevrolets, destined for sale in the British Isles, have been placed aboard ship at Montreal. This shipment is the first of what is hoped will become a constant trade between Canada and Great Britain; it also is the first noticeable sign of improvement in exports of automobiles from Canada which has been anticipated ever since the announcement of the reduction in horsepower tax effective Jan. 1, in Great Britain.

All Chevrolets for Great Britain, it has been announced, will be made at Walkerville and Oshawa, inasmuch as the high Canadian content of these cars gives them preference in the British field. An active merchandising effort, it is understood, is to be put behind the cars in England by General Motors Export, and Pass & Joyce, Ltd., have been appointed distributors for the car with a dealer organization of 150 outlets throughout England, Scotland and Wales.

Canadian Ford Co. Votes to Increase Dividend

A dividend increase of 25 cents per share, making the total 75 cents per share, has been voted by the directors of the Ford Motor Co. of Canada, Ltd., the dividend is payable Dec. 17 to stockholders of record as of Nov. 30. This is the largest dividend paid to the stockholders of the company since 1930. A 50 cent per share dividend was voted last May 28, and this coupled with the recently voted increase makes a distribution of $1.25 per share, or a total of $2,073,700 for 1934. Last year the company made only one dividend distribution which was $1 per share.

Demonstrated at the Automotive Service Industries Show in Cleveland last week was this new type of oil dispenser for marketing motor oil from sealed 10-gal. containers. By means of the knobs shown in the photograph the grade and quantity of the oil is regulated, and after the lubricant has been delivered a blast of air cleans the hose and nozzle

Seek Rate Agreement Amendment to Truck Code

An amendment designed to incorporate in the trucking code a provision for rate agreements has been drafted and is now being subjected to preliminary discussions between NRA officials and members of the National Code Authority for the trucking industry.

While discussions are being carried on concerning the proposed amendment operators are still required to file rates which will not be less than cost. The proposed amendment provides that rate trade agreements may be made among members of any group of the defined industry, and that such group is to be determined by the natural divisions of the industry by class or character of operation, by territory, or both by character and territory. It also provides that operators who are not subject to such provisions will be subject to the present provision for filing rates and for providing that such rates are not below cost, through the Cost Formula, when complaints of inadequacy are made.

Bendix Entertains Teachers

Twenty-five Chicago manual training educators have been in South Bend, the guests of the Bendix Aviation Corp. at South Bend, where they visited the Bendix plant and the Bendix Safety Service school. The group was in charge of Joseph Doyle, Bendix branch manager in Chicago.

Carter Enlarges Plant

Carter Carburetor Co., an ACF subsidiary, is building a four-story addition to its St. Louis plant. This will increase the manufacturing and engineering facilities in anticipation of 1935 releases for carburetors and automatic chokes made by the company.

Carrittes Take Over True Alloys, Inc.

The Non-Ferrous Foundry of True Alloys Incorporated, Detroit, has been taken over by J. P. Carritte and J. P. Carritte, Jr., former executives of Detroit Aluminum and Brass Corp. The new management will specialize on high-grade alloys of aluminum and bronze.

Preserve Ford Fair Rotunda at Dearborn

Gear-Shaped Structure To Be Reception Hall At River Rouge Plant

The large gear-shaped rotunda which formed the central motif of the Ford building at the Century of Progress is to be disassembled and moved to the Ford River Rouge plant to form a visitor's entrance to the grounds and a reception room with a permanent display of Ford products.

The site chosen for the permanent location of the rotunda is the triangular plot of ground covering 13½ acres along Coolidge Highway directly opposite the administration building. Aside from providing more comfortable accommodations for visitors the reconstructed rotunda will relieve some of the pressure now borne by the over-crowded administration building. Not only will the circular section be moved from the exposition grounds, but also that wing known as the "Century Room." To match this wing a duplicate will be constructed on the opposite side of the circular main building. Both wings will parallel the Coolidge Highway. The round section will occupy a circle 210 ft. in diameter; each wing will be 100 ft. in length with a width of 84 ft., 4 in., and 31 ft. high. A parapet 10 ft. higher will adorn each wing.

In the rotunda will be placed the photographic mural depicting scenes in and around the Rouge plant. Below the mural, encircling the rotunda will be a veneer of natural wood from the Ford forests in Brazil. As a matter of fact, everything possible of the Chicago exhibit will be preserved in the new reception hall, including the "Ford World," a revolving globe 20 ft. in diameter on which Ford properties are spotted. The "V-8" fence surrounding the globe will be preserved.

At the Chicago exhibit the rotunda housed the collection of horse-drawn and gasoline-driven vehicles, which will be placed in the Ford Museum at Dearborn. In their place in the rotunda there will be displayed the latest models of Ford V-8's, Lincoln cars, Ford trucks, commercial units and other Ford products.

In the north wing there will be a display of operating machinery and public rest rooms. The south wing will house a theatre seating between 400 and 500 persons. The theatre will show new motion pictures, and when necessary will be used for meetings of Ford dealers and salesmen.

Above is the architect's drawing of the building which will be erected on a 13½-acre landscaped park, across from the Ford administration building. Surrounding the rotunda, with its two 110-foot wings, will be the famous Roads of the World, a feature of the Ford Exposition in Chicago in 1934

Passenger Car Production by Wholesale Price Classes

(U. S. and Canada)

Nine Months 1934 and 1933 Compared

	1934	1933	Per cent change	Per cent of Total 1934	Per cent of Total 1933
Under $500	1,385,519	1,250,217	+ 10.8	65.80	81.68
$501-$750	620,063	217,358	+186.0	29.45	14.21
$751-$1,000	59,931	28,481	+110.0	2.85	1.86
$1,001-$1,500	24,788	15,790	+ 57.0	1.18	1.03
$1,501-$2,000	7,434	9,384	— 20.8	.35	.61
$2,001-$3,000	6,035	7,622	— 20.9	.28	.50
$3,000 and over	1,866	1,687	+ 10.7	.09	.11
Total	2,105,636	1,530,539	+ 37.1	100.00	100.00

Truck Production by Capacities—Ten Months

(U. S. and Canada)

	1934	1933	Per cent change	Per cent of Total 1934	Per cent of Total 1933
1½ tons and less	484,988	285,802	+ 69.7	92.57	92.60
2-3 tons	31,777	18,918	+ 68.0	6.07	6.13
3½ tons and over	5,229	2,864	+ 82.6	1.00	.93
Special and buses	1,915	1,057	+ 81.2	.36	.34
Total	523,909	308,641	+ 69.8	100.00	100.00

Repairs to Durant Plant Indicate Factory's Use

Activities around the huge plant of the old Durant Motor Company located on Lansing's west side indicate the place may be used for manufacturing purposes in the near future. Railroad sidings are being repaired, changes are being made in the steel supports, the roof is being fixed and the entire interior has been repainted.

The plant and property, consisting of 21 buildings and more than 50 acres of land, were purchased by the Borg-Warner and Houdaille-Hershey corporations under the holding firm name of Lansing Manufacturing Co. when the plant was placed on the auction block more than a year ago. With good business reported in all plants of these corporations it is possible they may go into production of some type in the Durant factory.

What adds significance to the repair work here is the fact that Don Devor, an official of the Houdaille-Hershey Corp. in the Detroit plant, has come to Lansing frequently to observe the work being done.

GM Truck Names 2 Zone Managers

Two zone managers for General Motors Truck Co. were appointed this week. They are D. W. Thompson, who will take charge of the Nashville, Tenn., zone, and John Hancock, who has been assigned to the Memphis zone. Mr. Hancock has served the GM company as a sales representative for five years, while Mr. Thompson has had a long retail experience in Nashville.

Winton Gets Navy Job

The Winton Engine Co., GM subsidiary, has received a $2,142,764 order from the Navy Department to furnish propelling machinery for the new submarines, Nos. 176, 177, 178, now being built by the Electric Boat Co.

Exports and Imports for the Automotive Industry for October and 10 Months Ended October, 1934-33

	October				Ten Months Ended October			
	1934		1933		1934		1933	
	Number	Value	Number	Value	Number	Value	Number	Value
Automobiles, parts and accessories	....	$12,353,102	....	$8,592,915	....	$166,778,074	....	$73,982,149
Motor trucks, buses and chassis (total)	7,512	3,574,865	5,567	2,767,761	78,510	37,150,186	33,880	15,337,246
Under one ton	633	228,437	550	162,396	7,967	2,603,592	3,806	1,096,146
One and up to 1½ tons	6,120	2,631,414	4,028	1,606,592	61,029	25,625,146	25,498	9,632,664
Over 1½ tons to 2½ tons	585	481,491	747	658,438	7,660	6,156,628	3,436	2,817,160
Over 2½ tons	138	207,205	213	331,862	1,518	2,537,690	917	1,675,746
PASSENGER CARS								
Passenger cars and chassis	8,040	4,376,409	5,906	2,993,177	127,668	70,291,512	57,918	28,256,668
Low price range $850 inclusive	7,406	3,703,199	5,516	2,558,530	117,205	58,777,755	53,875	23,680,641
Medium price range over $850 to $1,200	391	380,619	162	157,752	7,023	6,769,022	2,228	2,153,034
$1,200 to $2,000	102	154,024	83	137,690	1,844	2,799,187	960	1,455,716
Over $2,000	42	98,077	41	103,432	597	1,560,526	284	739,518
PARTS, etc.								
Parts except engines and tires	....	....	....	....	....	....	....	....
Automobile unit assemblies	....	1,933,929	....	832,581	....	32,952,638	....	14,921,401
Automobile parts for replacement (n.e.s.)	....	1,824,349	....	1,494,913	....	18,190,192	....	10,235,270
Automobile accessories (n.e.s.)	....	189,091	....	163,647	....	2,160,410	....	1,178,717
Automobile service appliances	....	169,234	....	89,303	....	2,101,598	....	891,385
Airplanes, seaplanes and other aircraft	49	723,259	18	128,166	456	7,383,595	343	4,708,693
Parts of airplanes, except engines and tires	....	643,522	....	361,578	....	3,734,205	....	1,971,703
INTERNAL COMBUSTION ENGINES								
Stationary and Portable:								
Diesel and semi-Diesel	16	12,387	4	38,850	111	241,715	28	108,275
Other stationary and portable:								
Not over 10 hp.	562	36,371	296	16,483	4,889	314,873	2,600	165,761
Over 10 hp.	126	42,742	43	27,423	898	529,849	662	275,537
Automobile engines for:								
Motor trucks and buses	167	39,891	39	10,602	3,673	482,275	1,686	218,727
Passenger cars	177	25,774	898	46,309	20,209	1,276,365	18,561	1,122,923
Aircraft	61	225,800	216	186,528	859	3,340,396	2,292	1,118,835
Accessories and parts (carburetors)	....	103,257	....	73,101		1,144,557	....	792,330
IMPORTS								
Automobile and chassis (dutiable)	81	16,486	71	41,099	465	127,266	430	240,543

Storage Battery Code Amendments Proposed

To correct typographical errors and clarify the intent of the Electric Storage and Wet Primary Battery Code the National Code Authority for the industry has applied to NRA for amendments to the present code. The proposed amendments follow:

Schedule I, Section 1 (A) "Branding" is amended to read:

"Failure either actually to mark or brand each battery classified as Class I Products in Schedule II, or to refer by type or number or other designation marked on the battery to published specifications, with respect to the capacity and quality of the battery as set forth in Schedule II, Class I Products, Section 2 is an unfair trade practice."

Schedule II "Domestic Marketing Standards for Class I Products"—Section 2 "Guarantees & Adjustment Policy"—the paragraph reading: "The ampere-hour capacity as given above shall be determined as provided in the standard specifications for lead acid storage batteries for automotive equipment of the Society of Automotive Engineers (Adopted January, 1932)."

is amended to read:

"The capacities as given above shall be determined as provided in the standard specifications for lead acid storage batteries for automotive equipment of the Society of Automotive Engineers. (Adopted January, 1932)."

"Domestic Marketing Standards for Class II Products," Section 2 (D) is amended to read:

"In no case shall a cash refund be allowed."

Schedule I, Article 3 "Misrepresentation" is amended to read:

"The making or permitting to be made or published of any false, untrue or deceptive statements, by advertising or otherwise, concerning the capacity, quality, performance, substance, nature, origin, size or preparation of any batteries, component parts, electrolyte or accessories is an unfair trade practice."

Schedule II, Article 2, Group I "Adjustment Period for Wood Insulation," first number of months in column is amended to read "6".

New Jersey, No. Carolina to Use Aluminum Plates

Aluminum license plates will be used in New Jersey and North Carolina, according to the *Aluminum News-Letter*. The plates to be used in North Carolina next year will have a black background with raised letters in the natural aluminum finish. Among the advantages claimed for license plates of the light metal are that aluminum does not rust, gives a high-visibility license plate, and saves the states a good deal of money on postage.

Graham, Thatcher Export Association Directors

Robert C. Graham, vice-president of Graham-Paige International Corp., and W. F. Thatcher, assistant to the president of Chrysler Corp., have been elected directors of the American Manufacturers Export Association.

James D. Mooney, president of General Motors Export Co., was re-elected president.

Classification of Diesel Fuels Set Up by A.S.T.M.

A classification of Diesel fuels embracing five different grades has been established by the American Society for Testing Materials, and has been circulated for comment among manufacturers and users of Diesel engines and petroleum refiners. One of the fuels, No. 1-D, is intended for use in high speed, solid-injection Diesel engines operating at over 1000 r.p.m. It is a distillate oil of low viscosity. The flash point is specified as 115 deg. F. or the local legal minimum flash point. Water and sediment must not exceed 0.05 per cent by volume. The Saybolt Universal viscosity at 100 deg. F. must not be less than 32 and not more than 50. The carbon residue must not exceed 0.2 per cent by weight, the ash, 0.01 per cent, and the pourpoint must not be higher than 35.

So far as is known, sulfur content need not be considered as regards combustion characteristics. However, a limit of 2 per cent is suggested where engines are operated intermittently, to limit corrosion. The classification table also contains a column for "Ignition Quality"; no values are given under this heading but a reference is made to a discussion under Methods of Testing, Paragraph (g), Ignition Quality.

Public Safety May Require That Cars Have Radio Interference Suppressors

Police powers of local authorities may be invoked to require *all* automobilists to install radio-interference suppressors on their cars, as a measure of public safety, Dr. Orestes H. Caldwell, former Federal Radio Commissioner, and now editor of *Electronics* and *Radio Retailing*, told radio and electrical engineers at Yale University, New Haven, Conn., in an address delivered at the university last week.

"Ignition systems of modern automobiles constitute one of the most serious sources of interference for short-wave radio sets," explained Dr. Caldwell. "The high-tension spark plugs on any car are, in themselves, small radio transmitters, which send out radio flashes that interfere with regular short-wave radio reception. Now that in a number of cities police-radio communication systems are being installed on these short-wave channels in the six to seven-meter band, ordinary unshielded automobile ignition becomes an important source of interference with police communication. Unless this interruption of police radio service can be prevented by educational efforts, such as are now being undertaken by the radio industry, the police authorities themselves may have to take a hand and rigidly enforce the installation of spark suppressors on all local passenger automobiles, buses, trucks and motorcycles, in the interests of public safety.

"Another problem in automobile radio will be introduced by the all-steel tops to be used on a large scale in the automobile production of 1935, according to reports from Detroit," said Dr. Caldwell.

"This will mean that radio antennas will have to be of the underslung type. Already the space is scant under the chassis, and in these few inches between ground and car body, the antenna will have to be hung, as far from the car and as close to the ground as possible. Under these conditions, average radio pickup may be as little as one-fifth of that provided by an antenna in the car roof, so that more sensitive sets will be needed."

Germany to Increase Synthetic Gas Output

In order to economize on foreign exchange, Germany has decided to greatly increase its production of synthetic gasoline from coal, even though the production cost is estimated to be four times as great as the price at which gasoline from petroleum can be bought in bulk. A new process is said to have been invented recently which has the advantage over the old process in that no extensive high-pressure apparatus is required. This is an improved Bergius process. The original Bergius process (described in *Automotive Industries* of Nov. 25, 1926) has been in operation for about eight years.

During the early part of the year the I. G. Farbengesellschaft (the dye trust), which controls the Bergius patents, applied to the government for guarantees which would warrant it in proceeding with the development of the new process, but it met with refusal at that time. Now the government takes a more favorable attitude, and a combine of the Ruhr coal mines has been formed which will jointly finance the installation of a large-scale experimental plant.

New Propeller Developed

HARTFORD, CONN.—A new constant-speed type of the Hamilton Standard propeller has been developed, it is announced. This overcomes the limitation of the original Hamilton Standard variable-pitch propeller to two positions—a low-pitch position for take-off and climb, and a high-pitch position for cruising and high-speed flying. The constant-speed control acts as a governor, holding the engine to whatever operating speed the pilot selects regardless of load variations. With this control it is possible to set the propeller speed for the smoothest operating conditions, and this speed will be automatically maintained in flight and also in dives, the latter feature being of particular value in military service.

Young Co. to Build New Wire Mill Says Report

The L. A. Young Co., it is understood, will shortly begin construction of an extensive wire drawing plant, probably on vacant land adjacent to the present factory at Milwaukee Junction. It also is understood this venture will be made under a trade arrangement with the New England High Carbon Wire Co. This will be the second new venture for the Young organization this year, the earlier one being the merging of the Ryan Foundry Co. with the Young interests.

According to current rumors the projected wire plant will entail the expenditure of upwards of $100,000 and involve the employment of several hundreds of workman.

CALENDAR OF COMING EVENTS

SHOWS

New York Automobile Show.....Jan. 5-12
Los Angeles Automobile Show.....Jan. 5-13
St. Louis Automobile Show.....Jan. 6-12
Cincinnati Automobile Show.....Jan. 6-12
Washington Automotive Assoc., Automobile Show .....Jan. 12-19, 1935
Toronto, Canada Automobile Show, Jan. 12-19
Newark, N. J. Automobile Show..Jan. 12-19
Buffalo, N. Y. Automobile Show.Jan. 12-19
Cleveland Automobile Show.....Jan. 12-19
Milwaukee Automobile Show....Jan. 12-19
Detroit Automobile Show.....Jan. 12-19
Brooklyn, N. Y. Automobile Show.Jan. 14-19
Philadelphia Automobile Trade Assoc. —Automobile Show .....Jan. 14-19
National Motor Boat Show, New York .....Jan. 18-26
Columbus, Ohio Automobile Show Jan. 19-24
San Francisco Automobile Show.Jan. 19-26
Baltimore—Automobile Show....Jan. 19-26
Boston Automobile Dealers Assoc.—Automobile Show .....Jan. 19-26
Pittsburgh, Pa. Automobile Show, Jan. 19-26
Hartford, Conn. Automobile Show.Jan. 19-26
Syracuse Automobile Show .....Jan. 19-26
Nashville, Tenn., Automobile Show Jan. 20-26
Rochester Automobile Show.....Jan. 21-26
Chicago Automobile Show...Jan. 26-Feb. 2
Montreal, Que., Automobile Show Jan. 26-Feb. 2
Springfield, Mass. Automobile Show, Jan. 28-Feb. 2
Omaha Automobile Show.....Feb. 3-9
Kansas City, Mo. Automobile Show Feb. 9-16
Denver, Colo. Automobile Show..Feb. 10-23
Peoria, Ill., Automobile Show....Feb. 13-17
Bethlehem, Pa., Automobile Show, Feb. 18-23
Evansville, Ind Automobile Show.Feb. 23-27
Minneapolis Automobile Show....Mar. 9-16
Mankato, Minn. Automobile Show Mar. 16-23

MEETINGS

Society of Automotive Engineers—Chicago—(Tractor & Industrial Power Equipment Meeting)....Dec. 5-6
Automobile Trade Association Managers Midwinter Meeting—New York...Jan. 6

ANNUAL MEETINGS

American Society of Mechanical Engineers—New York .....Dec. 3-8
Society of Automotive Engineers—Annual Banquet—New York .....Jan. 7
Motorcycle & Allied Trades Assoc., New York City .....Jan. 9
American Engineering Council, Washington, D. C. .....Jan. 10-12
Society of Automotive Engineers—Annual Meeting—Detroit.....Jan. 14-18
American Roadbuilders Assoc., Washington, D. C. .....Jan. 22-25
Automotive Parts & Equipment Mfrs., Inc.—Chicago .....Jan. 29

CONVENTIONS

National Automobile Dealers Assn., Detroit .....Jan. 14-15

EXPOSITION

Natl. Exposition of Power & Mechanical Engineering (Biennial) New York, N. Y. .....Dec. 3-8

FOREIGN SHOWS

International Aeronautic Exposition, Paris, France .....Nov. 16-Dec. 2

Transverse-Leaf-Spring Independent Suspension Features 1935 St

A NEW system of independent spinging, involving the use of a transverse leaf spring; hydraulic brakes, over-drive units (on the President), and a new front-end styling which markedly improves the appearance of the entire line, are features of the new Studebaker models. The front independent spring system is standard on all President and Commander models and optional at $25 extra on Dictator models.

The base price of the Dictator remains unchanged, while that of the Commander has been increased from $865 to $895 and that of the President from $1,170 to $1,245. The horsepower of the Commander has been increased considerably. This model is now carrying an engine similar to that of the President engine, with longer stroke, which has a rated output of 107 hp. at 3800 r.p.m., as compared with 103 at 4000 for the former engine.

In its new front-end suspension Studebaker has incorporated springs of much lower rate than previously used, 125 lb. per inch (at the wheels), as compared with 300, but has provided a suspension which gives really remarkable body stability at high speeds, particularly on curves.

Needless to say, the ride of the new cars represents a decided improvement over that of last year's models and compares favorably in many respects with that of 1934 models having independent springing of other types. The front-end frequency is probably somewhat higher than in most of this year's independently sprung cars, but the amplitude is lower, and the general impression is that an excellent compromise between frequency and amplitude has been effected in the design of the suspension.

The system is similar to that used on the Delage abroad, comprising a transverse leaf spring extending between the lower ends of the steering heads, while the upper ends of the latter are guided from the frame side rail through tubular links which take the brake torque, etc. Below the spring there is another set of links, extending from the front cross-member to shackles at the spring eyes. These links, however, have no particular running function and are provided mainly as a safeguard in case of spring breakage. The spring, which consists of a large number of thin leaves of silicon-chromium steel, is mounted in an unusual manner, in that there is no direct connection between the spring and the frame of the car. As shown in the assembly views of the front suspension, the U-bolt which holds the hump-center spring leaves together, also holds in place a number of short, thin spring-steel plates which hold the spring against endwise motion, being located in a box

The new Dictator Custom Sedan for six

Independent Studebakers

by Athel F. Denham
Detroit Editor, Automotive Industries

The radiators of the 1935 Studebakers set a new style

Instrument panel of the Studebaker President. Note the steering wheel design and the radio in the roof header

bolted to the front cross-member. Four inches from the center of the cross-member on each side there is a cam-shaped block through which the chassis weight is transferred to the spring. If one wheel is raised the spring pivots about the bearing block on that side and its center is slightly lowered. Since the spring is clamped in one plane only, at the center of its length, its entire length is active.

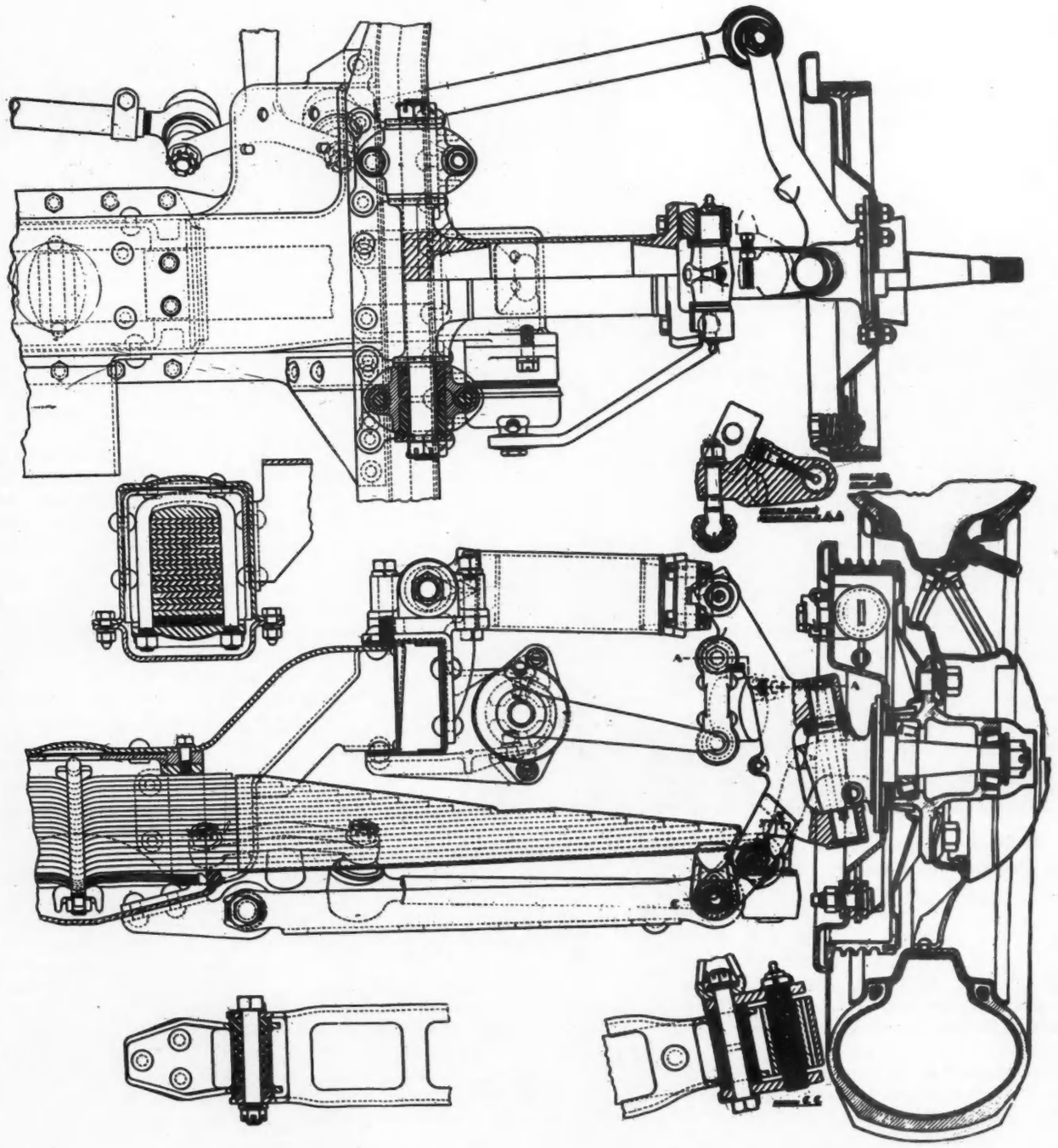
The geometry of the front end has been so worked out that there is no tread change in 4½ in. of wheel rise, any vertical motion of one wheel being accompanied by a change in camber of that wheel. Camber adjustment is by shims at the upper end of the steering head. No adjustment for caster is provided, it having been found that the suspension is not at all sensitive to changes in caster angle.

Supplementing the suspension are double-acting hydraulic shock absorbers, acting exceedingly lightly on compression. Rebound adjustment is also quite light, which speaks well for the design of the suspension system. Rubber blocks on the frame cushion excessive impacts, but no provision is made for automatically increasing the spring rates for large deflections. The main spring consists of 18 leaves on the Commander and President, 14 on the Dictator. The second leaf has a half wrap about the spring eye, to provide added insurance against spring breakage. The first and second leaves are made without camber, so with the spring under normal static load there is almost no stress in the two main leaves, a feature that adds to the safety of the system. Tests indicate that the factor of safety against breakage is considerably greater with this spring than with the higher-rate springs used on former Studebaker models. Furthermore, spring leaves are ground and polished on the tension side before heat treatment, to eliminate surface imperfections which might initiate fatigue failure.

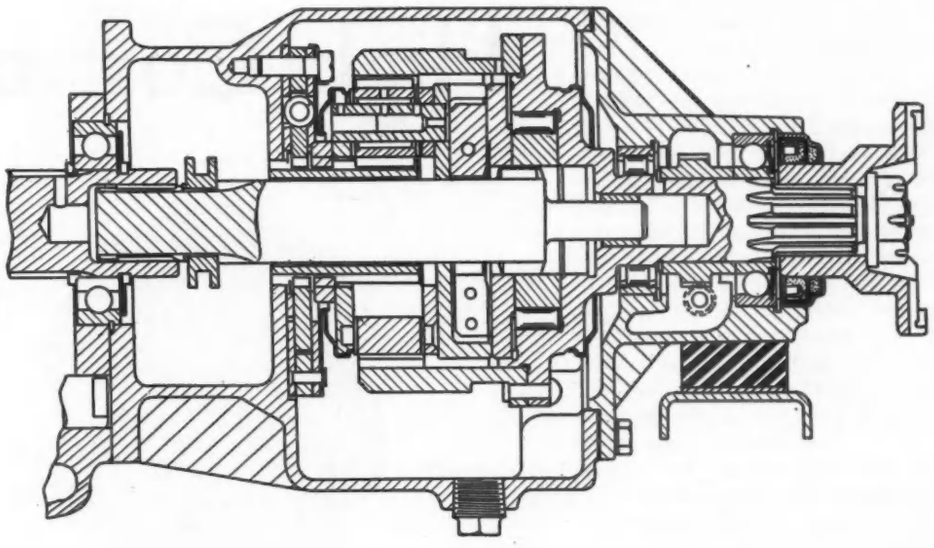
To keep the frictional characteristics fairly constant, the springs are provided with metal boots and are lubricated in assembly. These spring covers are specified as "a standard accessory at slight extra cost." Rubber bushings are used at the inner end of the upper links, needle bearings at the outer end of these links (upper end of the steering head),

and there is a threaded bushing in the spring eye. Periodic lubrication is required only by the spring eyes, and the number of points requiring lubrication is even smaller than in a conventional suspension. The lower or safety links also have rubber bushings, and these are sufficiently soft so that the maximum change in effective length of these links—3/32 in.—is taken care of by the rubber.

The really remarkable stability of the new cars on curves and the absence of body roll and tire squeal are difficult to explain satisfactorily. An important factor in this connection is undoubtedly the double flexing of the spring, which materially increases spring stiffness and reduces body roll. It is possible, also, that the friction of the leaf spring contributes somewhat to this desirable result. Transverse springs also have



Assembly views and details of Studebaker independent spring system



The automatic overdrive which is standard equipment on the President

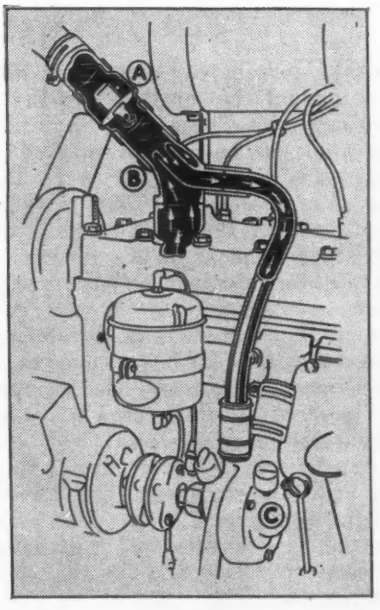
a higher resistance to distortion in the transverse plane than longitudinals. It is probable that the combination of all these factors accounts for the stable ride. Anti-roll devices have been found unnecessary with this suspension.

The major change from the appearance standpoint consists in the adoption of a new radiator shell having a narrow V-shaped sloping front and sides curving backward and outward to meet the hood lines. The side sections of this shell are composed of horizontal fins which at the top represent an extension of the horizontal hood louvres, but are continued to the bottom of the shell, thereby increasing the amount of opening for air flow through the core. The radiators themselves appear to be no narrower than last year. Sheet metal work below the radiator shell has been altered also, a concave splash pan sweeping forward to a more horizontal finish at the front, enabling a very nice fairing of splash pan and fenders.

The front fenders appear to have been pulled down slightly at the front, particularly at the skirts, to more effectively conceal the chassis. In general, however, the shape has not been altered.

Built-in trunks have been growing in popularity in recent years, and Studebaker this year has increased the size of its trunks quite materially. This has involved the provision of a new type of rear tire carrier, which is so arranged that the top of the tire can be swung backward, away from the trunk, to provide better access to the latter. Fender wells are available on the new models.

In connection with the front-end suspension, changes have been made in the steering mechanism, which now incorporates a split tie-rod of which the right member is longer than the left one. Both are connected to a Y-shaped crank at the center of the chassis, from which a drag link extends to the pitman of the steering gear, which latter has been moved farther forward. This arrangement may not provide theoretically perfect geometry for steering, but in practice it has proved very satisfactory, and the cars handle nicely with apparently no tendency to wander or tramp. Toe-in is adjusted through the longer tie-rod only, the shorter, left tie-rod being fixed. There are only four ball joints in this construction.



Studebaker's new automatic thermostatic water heating device

The water is kept from entering the radiator until it has reached the proper temperature by the check valve (A) and is returned through the "Venturi" (B) to the cylinder block at the left of the pump (C). When the water is warmed—and cold water is heated to 140° in 3½ minutes—the check valve (A) opens automatically and access to the radiator is gained

A feature of the brakes on the new Studebakers, referred to as "compound hydraulic brakes," is that the piston and cylinder actuating the front shoe are larger than those for the rear or self-energizing shoe. This tends to equalize the action of the two shoes and also to equalize wear. The master cylinder, of course, is self-filling and is located at the brake pedal. Hand brakes operate the rear-wheel brake shoes through a mechanical linkage and cams. Drums are 11⅛ in. in diameter on the Dictator, 12⅛ in. on the Commander, and 13⅛ in. on the President. All linings are 1¾ in. wide and ¼ in. thick.

Engine temperature control by means of a thermostat and by-pass

(*Turn to page 680, please*)

High Cost of Selling th

by Edward Payton*

IN only two years out of the past twenty did as much as 3 per cent of our total population buy any passenger car of any make, all makes and prices included.

It follows that the dealer capable of selling in his territory one-half of all passenger cars sold can work effectively in any one year with only 1.5 per cent of his population. In multiple dealer areas, or if he handles one of the less popular or high priced car lines, he may be lucky to get 10 per cent of the total passenger car business—all prices included. In that case, even during the best years, he works effectively with but three-tenths of one per cent of the population in his territory, and with but one-tenth of one per cent in a year like 1932.

It is because we ignore these obvious facts that we talk about the "high cost of selling." Because it is a mislabel, it is a myth. What we really mean is the "high cost of failure to sell after effort," the effort being made by using salesmen to sift—not to sell.

This "high cost of failure to sell" is unnecessary. It is the result of dumb general and sales management. The future will demand that it be eliminated by dealers who are to survive in this business. A profit can hardly be expected if we insist upon sifting 99.7 per cent of the population to find the three-tenths of one per cent. Every actual current buyer in any price group can be identified, continuously and permanently, and for much less cost than the sifting process involves.

Some dealer sales and general managers console themselves with the knowledge that they confine their sifting effort within the group of present motor car owners. This does eliminate some of the sifting cost—but not enough. It may furnish the business with a pacifier when it is crying for a bottle of milk.

Let us again turn to the experience of our own industry. From 70 per cent to 80 per cent of all cars being driven at any time were bought by their present owners as used cars. The variation in percentage depends upon the community concerned.

This group, comprising from 70 per cent to 80 per cent of all car owners at any time, "come up" to new cars slowly, at the rate of from 3 per cent to 7 per cent per year, again depending upon the type of community being served. Thus it takes from 15 to 33 years to turn from 70 per cent to 80 per cent of car owners into new car buyers.

Only from 20 per cent to 30 per cent of current car owners at any time bought the car they now drive as a new car. These make up nearly the whole of the new car market in any price group. They were the buyers of new cars in 1924, in 1932, and again in 1934. They make up the stable element in every community. Never—during the past fifteen years—has this group of new car buyers failed in turning themselves into repeat new car buyers once each four years in the lower price groups, and once within each seven years in higher priced groups.

Among our clients generally this new car buyer group has never bought less than 270 cars per year per thousand buyers, and they have gone over 500 new cars per year per thousand buyers.

Thus the total market for new cars, all makes and all prices, lies within that 20 per cent to 30 per cent of all car owners who definitely buy new cars, plus the 3 to 7 per cent of used car buyers who come up annually. This is true at all times. The combined total has never exceeded 3 per cent of the population, has reached this figure in only two of the past twenty years, and came down to less than 1 per cent in 1932.

The one major job of future general and sales management is definitely to know—know in advance of purchase—just who these buyers are in the area and price group, just when they are likely to buy, and enforce timely salesman contact with every one of these identified buyers without necessity for sifting 99 per cent of the population and about 85 per cent of the car owners.

Accidental sales contact and accidental selling are on the way out, and no longer support the title "sales manager." There was a double hazard in the old type of accidental selling that can no longer be justified; first the accident of finding a buyer, and second the accident of finding him in time—before being locked out for two or three years by his purchase of a competing car or from a competing dealer.

Many a sales manager is learning of the opportunity to sell through the lists of registrants of new cars after the sale has been consummated by the other fellow. Ignorance of how

*Adapted from an address before the annual convention of the Pennsylvania Automotive Association.

that Doesn't SELL

to learn of the opportunity before it is lost is no excuse for continuing the practice.

With the facts covered thus far in mind—facts that must be obvious to all of you—I will point the general direction in which I believe successful general and sales management will be compelled to move in the future—especially if these functions are to safeguard dealer investment, and I believe only these functions can fully safeguard it.

The first job of management will be to decide just what territory is to be covered at retail.

Next, the manager will decide what makes of cars, the original purchase of which when new indicated ability to buy a car that he has to offer, he wishes to trade into his used car department.

These proven buyers should then be identified, with purchasers for a predetermined prior period covered, the length of this period depending upon the new car price group being sold.

A continuous and perpetual inventory of this identified buying power should be made up on the proper record forms, with the first entry being the final handling of recurring items. Half the clerical cost of sales follow-up can be eliminated through use of right methods. There is nothing more foolish than the practice of continuously re-writing such items as names, phone numbers, street addresses, etc.

A specific number of proven and identified buyers should be assigned each new car salesman, the number assigned depending upon the type, price, and popularity of the cars being sold, and the length of the prior period covered. This group should remain as the clientele of the salesman so long as his services are satisfactory. The pay *rate* to the salesman should increase, retroactively, as his sales approach an assigned standard sales task on the annual basis. The test of the salesman is the proportion of total price group business actually closed within the assigned group that he procures for the cars he sells. The pressure of the retroactive rate on annual performance within the assigned standard sales task should fall with increasing force during the slower seasonal sales period.

No salesman should be employed until the management has ready for him his specified number of proven buyers.

In organizations doing as much business as $100,000 annual retail new car sales or more, half-breed sales jobs between the new and used car departments should be eliminated. The half-breed is always an outcast, and from both sources of his origin. It is the same with half-breed functions.

Pay to used car salesmen should provide premium rates for speed of inventory turn and the elimination of inventory sleepers.

Within the permanent catalog of proven buyers there should be automatic means of salvaging those who may lose new car buying ability by the used car sales department.

Great masses of buyers have not kept pace with the changes of the past five years, have not brought themselves up to the skill and understanding that their former vocations may now demand. Others have permitted the stress of the past five years to destroy their morale. So many things point to the strict necessity of working within a pre-identified new car buyer market for best results that it would be sheer stubbornness on the part of dealers and sales managers to resist so working. The showing of each dealer for the next 10 years will depend upon the speed and thoroughness of his getting under way with this job.

To those who will recognize this need, and act accordingly, the future offers ample profit in motor car selling. No doubt some of the old time high speculative profit accruing to distributors is gone for good. But the future may offer a more secure profit to the man who can meet future requirements, and in the aggregate perhaps a greater profit than has accrued in the past.

Car Factory Sales Managers

THE sales tactics described here, Mr. Payton tells us, are not only reducing the selling costs but increasing the volume of dealers who are using them.

The premise on which these tactics are based is that NEW CAR BUYERS BUY NEW CARS, and that USED CAR BUYERS BUY USED CARS except for from three to seven per cent who become new car buyers.

Mr. Payton states that the records of his many clients prove these premises and that therefore selling effort should be directed at those who have the NEW CAR buying habit, representing 20 to 30 per cent of all registrations, instead of spreading effort over all car owners as is so commonly done now. Buyers who have the new car habit can be readily identified from registration lists. The result of concentrating on buyers so identified, Mr. Payton declares, will be more sales at less expense.

As every one knows Mr. Payton is a specialist in dealer sales, management and financial problems with a coast-to-coast reputation in the trade. His clients include many of the most successful dealers in the country. The ideas he presents here command the attention of manufacturer sales departments which have the responsibility not only of helping their dealers to sell more cars, but also of selling them more profitably so that motor car retailing will steadily become a financially more stable and commercially more efficient business.

Oiliness, Sludging, Diesels an Featured Automotive Topics at

THAT influential elements in the petroleum industry have changed their views as to what constitutes the controlling qualities of engine lubricants, was apparent at the recent Dallas convention of the American Petroleum Institute. While you and I are just beginning to grasp the significance of viscosity index (VI), these men already have dropped the criterion or at least have deemphasized it and now are concentrating upon two more important qualities—oiliness and chemical stability.

Unless a lubricant has that elusive attribute of oiliness, its viscosity or viscosity index are of little value so far as protection of wearing parts is concerned. How oiliness is to be achieved, how it is to be defined, how measured, are matters that are being attacked in various ways by the different organizations.

Stability of engine lubricants is a matter of producing oils having maximum resistance to oxidation as well as to sludging effects. It is claimed that oils refined by the various solvent processes are particularly fortunate in being almost entirely free of sludging formation in the crankcase.

One of the most interesting papers presented at the automotive sessions was "The Structure of Liquids and the Mechanism of Viscosity" by W. K. Lewis, M.I.T. physicist. The paper was not available in printed form so we are forced to summarize it in our own words.

The Mechanism of Viscosity

In brief, Dr. Lewis explained the mechanism of viscosity on the basis of modern physical knowledge. First he drew attention to the apparant paradox that while liquids and gases have the same kind of chemical structure, the behavior so far as viscosity is concerned is vastly different. In gases, viscosity is low and substantially constant regardless of temperature and changes in density; in liquids, viscosity is relatively high, greatly affected by changes in density, and subject to wide changes.

Is it possible to find some way in which liquids might be given the same viscosity characteristics as gases—practically constant viscosity through a wide range of temperatures?

Let us examine the problem in the light of modern physics. First it is demonstrated that viscosity or internal friction of the medium is due to the mutual attraction of the molecules. In gases the molecules are relatively so few and so far apart that attraction forces are extremely low, indeed so low as to be unaffected by normal temperature changes. In liquids the molecules are closely packed and mutual attraction between molecules is very high. When chilled the molecules get still closer together and increase the internal friction or resistance to shear; when the temperature is increased, the molecules separate and internal friction is reduced correspondingly.

Suppose something could be added to the liquid that would slow down the activity of its molecules when heated. If that were possible, viscosity would be practically constant over a wide range of temperatures. It can be approximated by adding small percentages of very long-chain compounds of heavy molecular weight.

The materials used for this purpose have no polar or electric attraction for the molecules of the liquid but serve simply as "chemical brakes." Under normal conditions, using about one per cent of such substances in solution, the addition has no effect upon the properties of the lubricant. But as the temperature increases and the molecules of the liquid become more active and more widely separated, the long-chain heavy compounds begin to sag, much as a heavy metal chain would sag if when supported horizontally some of the props were removed. In thus sagging, these long chains interfere with the free movement of the molecules of the oil, slowing down their motion and causing more collisions with consequently increased attraction between active particles.

The problem of course, is to select the proper type of "chemical brake" because if the chain is too long or too heavy it may hang down into the mixture like a bunch of strings and create a gell or a heavy colloid.

It happens that the foregoing theory explains the function of Exanols in the blended, high viscosity motor oils just placed on the market by the Standard Oil of N. J. As explained in the paper, "Improved Motor Oils," by Otto, Miller, Blackwood and Davis (A.I., Nov. 17), Exanols are high-molecular-weight materials produced by polymerization of the light ends of refinery gasoline and are soluble in mineral oils.

A Controversy Exists

Reverting to oiliness, any lubricant no matter how produced either has oiliness or it hasn't and thereby hangs a tale. There is much controversy right now among the technologists as to the virtue of adding to "lubes" another type of long-chain fatty compound which is said to produce ideal oiliness properties.

In this connection we were fortunate in being able to spend considerable time with Dr. A. W. Burwell, noted exponent of oiliness, vice-president of Alox Chemical Corp. Certain Alox materials are saturated fatty compounds made from natural petroleum products. They are extremely long-chain compounds, produced synthetically, and have strong polar characteristics or attraction for metals. When a compounded oil flows through bearings these fatty compounds are immediately attracted out of the solution and attach themselves tenaciously to the metal parts of the bearing, thus producing a strong friction-reducing film which carries the load. The lubricant in this case serves chiefly as the vehicle for the film-producing material.

Only a small amount of this mate-

and Detonation at A.P.I. Meeting

rial is required—usually about one per cent—and it is said not to affect the other properties of the lubricant within reasonable limits. The trick is to find the right type of fatty compound compatible with the particular lubricant to which oiliness is to be imparted.

According to Dr. Burwell while no rigid definition of oiliness exists, it may be said that oiliness is that property of an oil film which prevents metal-to-metal contact, reduces friction and wear under all conditions of temperature and pressure existing in the bearing under service conditions.

Going back to Dr. Lewis's discussion, it may be a little confusing to see the difference in action between an Alox and an Exanol compound since both are heavy, long-chain materials. However, the difference is quite marked. While an Exanol compound is relatively inert, an Alox compound is extremely active and instead of sagging in the liquid it comes to the surface just as soon as the potential due to pressure and temperature is established and attaches itself to the metal surfaces.

In view of these developments don't be surprised to hear petroleum experts debating whether viscosity index or oiliness or whatnot must be inherent in the natural oil or whether these properties may be imparted by blending. If blending is an acceptable method (we understand that five or six major companies are now using Alox but not advertising that fact) what's the difference to the engineer provided the lubricant will work right in his engine?

As we understand it, this convention has paid more attention to the Diesel engine than any other in recent years. There were three papers on this subject, "The Evaluation of the Ignition Characteristics of Diesel-Engine Fuel Oils" by Moore and Kaye; "Outlook for the Automotive High-Speed Diesel Engine in Heavy-Duty Transport" by the writer; "Lubrication of Solid-Injection Diesel Engines" by W. G. Gordon. In addition, D. P. Barnard's paper, "Rail-Car Fuel Possibilities" touched on the Diesel at least in its discussion.

Much to our regret the session closed without any really definite action on Diesel fuel specifications. Oil men, to a certain extent, tend to underestimate the momentum behind this movement in motor truck transportation, in tractors and industrial units, in railroad work. They are worried about the distribution problem chiefly. But for a considerable time ahead the Diesel is likely to be restricted to large operations—fleet operators or large contractors—who will buy fuel oil in large quantities and in fact have been buying it in large quantities without difficulty.

by Joseph Geschelin
Engineering Editor, Automotive Industries

The biggest problem right now is the development of Diesel fuel specifications. Along this line we spent some time with a representative of one of the large refiners whose company has become very active in California in the railcar development. This company is cooperating with several of the large Western railroads that are adopting Diesel engines.

The first step was to formulate the specifications of an acceptable fuel having a rather high cetene number and this already has been done by cooperation with the railroad engineers and the engine manufacturers. Curiously enough although a specification fuel is supposed to be very expensive, particularly if a high cetene number is desired, in this case the reverse is true. This refiner found that in the normal cracking process he had been getting a certain fraction which remained uncracked and more or less static.

Be it by accident or design, the particular cut happens to have a high cetene number and is suitable as a railcar fuel. Now he is keeping a constant check in his refineries and is bleeding off the special cut just as soon as it is located. In this case the commercial incentive not only has opened a new fuel market but is cutting refining costs by bleeding off a hitherto useless material which took up volume, power in the form of heat, etc.

On E-P lubes there is considerable development afoot. One refiner told us that certain grades of E-P have been adopted in aircraft work for the lubrication of rocker arms, variable pitch propellers, and other parts.

Non-sludging lubricants are very much the thing right now since it is found that certain types of fuels in use today produce sludge-forming agents under certain conditions of operation. That seems to be one of the advantages of synthetic lubes as well as those produced with the aid of solvents since they can be made relatively free of sludge-forming components. The same naturally may be true of other well refined lubes.

Quite unexpectedly, a minority report attacked certain conclusions in C. B. Veal's paper, "The 1934 Detonation Road Tests." It was led by Dr. McKenz of the Texas Co., who showed by an independent analysis that correlation between the road tests and the A.S.T.M. test engine procedure was not within the range of experimental error. Discussion by Drs. Delbridge, Fraser and others seemed to indicate that not everyone participating in the 1934 road test was in agreement with the entire procedure and with the conclusions. In all fairness, it should be pointed out that the preliminary report on this project gave the complete details of procedure and, as Mr. Veal stated, action in the field was always subject to vote by those participating.

However, Dr. A. E. Becker mentioned that the A.S.T.M. was cognizant of the shortcoming of the present research procedure and that a committee was considering a number of important changes. Part of this program is to develop better test

methods not only in the laboratory but also in the field to get better correlation between the two. There is a possibility that instrumentation will be greatly changed. This may take the form of an improvement in the present bouncing pin method on the C.F.R. engine or the development of an entirely new method.

R. E. Wilson pointed out that correlation was quite difficult when it is realized that variations due to engine design overshadowed any experimental error in detonation work. Here indeed is a serious problem thrown into the laps of engine designers. The detonation work showed wide differences in sensitivity to octane number not only between engines of different makes, not only between engines of the same make, but in the same engine when run for a relatively short distance. In most cases there was a depreciation in condition; in one or two cases an actual appreciation.

Considering the great cost attending the production of gasolines of high octane rating, as well as the cost of producing an increase of even one octane number, it is discouraging, to say the least, to find that engines may differ by three octane numbers or more in their sensitivity to fuels.

What the critics at the A.P.I. meeting may not have known is that the matter of engine design is to be the subject of a third report on the 1934 Detonation Road Test project which is scheduled for presentation at the S.A.E. annual meeting in January. That ought to bring out some ideas of greatest importance to both engine designers and oil men.

Transverse Leaf Spring Independent Suspension

(*Continued from page 675*)

has been adopted for all Studebaker models. The thermostat itself is of the hose-line type, but the header outlet from the cylinder block below the thermostat is provided with a tube connected to the intake side of the water pump. Evidently, water flows continuously through this tube, but the flow increases when the thermostat valve is closed, which increases the pressure in the header.

Additional muffler sections have been incorporated in the tail pipes back of the frame X-member, to decrease exhaust noise.

Freewheeling and Startix are now additional at extra cost on Dictator but remain standard on the President and Commander models. Celeron fabric gears are now used for the camshaft drive of all engines.

As previously stated, the engine of the 1935 Commander is quite similar to that of the 1934 and 1935 Presidents, but the compression ratio for the standard cast iron head is somewhat lower, being 6.0 to 1.

The over-drive unit used on the President is of Warner-Gear manufacture and similar in detail to that used on two 1934 cars of another make. It differs in operation, however, cutting in automatically at 55 to 60 m.p.h., and then reduces the engine speed approximately 30 per cent for a given car speed.

Dictator models are now equipped with down-draft carburetors and the Dictator models with conventional front end suspension are provided with cross steering. These cars also have 17-in. wheels, whereas all other models are fitted with 16-in. wheels. Tire sections are 7.00 in. on the President, 6.50 on the Commander and 6.00 on the Dictator Six with independent springing. With 17-in. wheels the Dictator carries 5.50-in. tires. Larger tire sections are available on all models at extra cost.

One of the most interesting features of the new Studebaker models is the provision for mounting the radio in the roof header between the interior visors, which location seems to be more satisfactory acoustically than the usual dash mounting. All closed models are wired for radio. In this connection it is of interest to mention that 55 per cent of all Studebakers sold last year were radio-equipped.

The 1935 models have a new ventilating system. Front-door windows are one-piece, and the crank arrangement is worked out in such a manner that after the window is raised all the way, further motion slides it back from the front-door pillar. Rear-quarter windows in sedans are of the ventilating-wing type, hinged at the front and operated by means of toggle arms.

Particular attention has been given to interior treatment of the new President models. Steering wheels have chrome-plated spokes, made up of five spring-steel rods each. Rear compartments are equipped with hassocks instead of foot rests, and these are fitted with springs for soft cushioning. Ignition locks are indirectly illuminated. Robe rails carry an ash tray at each end. Sponge rubber is placed under the carpets. Dash clocks are provided. Other accessories include an engine heat indicator, two interior visors, and a cigar lighter.

On the Commander, foot rests are formed by depressions in the rear of the front seat. Ventilation is the same as on the Presidents. Standard equipment on this line includes freewheeling and automatic-starting units, two tail lamps, two windshield wipers, two sun visors, and a robe rail with ash receivers. Clocks are extra.

Interior equipment of the Dictator models is similar to that of the Commanders. The same as last year, all three lines are available with regal equipment, and sedans also with custom equipment.

JUST AMONG OURSELVES

More Miles Per Gallon

IT was long the contention of European manufacturers that they were handicapped in competition in overseas markets by the heavy annual taxes exacted on automobiles by their governments. These taxes, calculated on the cylinder bore or piston displacement, created a demand for small and low-powered cars in the home market, a type which was not acceptable in the same degree in certain export markets.

During the past year both Germany and France did away with the displacement tax, and England will follow suit on Jan. 1 next by materially lowering the annual tax. These changes in fiscal policy were made largely on the insistence of car manufacturers. It can be readily imagined that the prospect of an annual tax of from $40 to $200 acted as a deterrent to would-be buyers. However, the various Governments involved were in no position to dispense with the income from the automobile tax, and they had no intention of doing so; all they planned to do was to make payment of the tax somewhat easier and distribute the burden more equitably by levying the tax on the fuel. The degree to which fuel is being taxed in these countries at present is reflected by the fact that gasoline sells there at retail at between 50 and 60 cents per gallon although it is delivered in bulk at ports of entry at around 8 cents per gallon.

Some surprise has been expressed at the fact that elimination of the annual tax has not induced buyers to go in for larger cars. A little reflection will readily show the logic of their course. Under the increased taxes on fuel, fuel economy is more important than ever, and the best way to assure it is to stick to small, low-powered cars. A recent inquiry for flowmeters suitable for mounting on private passenger cars, from a firm of accessory dealers on the Continent, is indicative of the new importance attached to fuel economy as a result of the changes in methods of taxation.

* * *

Parts for Service On All Makes

SPREAD of the neighborhood service station idea under factor sponsorship seems to bid fair to break down officially a number of long, outworn traditions in the automotive industry, and provide definite recognition of many phases of automotive service work which factories previously have refused to acknowledge.

Some weeks ago, for instance, there appeared in Detroit newspapers advertisements by the Ford Motor Company itself showing the location of its dealers' neighborhood stations in the Detroit area. In this advertisement the statement "service on all makes of cars" probably represents the first time any major automobile manufacturer has been willing to indorse his dealers' efforts to obtain service business on competitive lines.

Factories generally, while recognizing that many dealers service all makes of cars when possible, have up to now largely refused to publicly or officially sanction efforts to obtain such business.

A second novel statement of importance appeared in these advertisements when considered in relation to "service on all makes." That statement read: "Highest grade parts and accessories used." Naturally, the Ford Motor Company demands of its dealers that in servicing Ford cars only "genuine" Ford parts be used. It raises the question, however, as to where the service stations are obtaining parts and accessories for servicing competitive makes and whether the "highest grade" referred to means genuine parts of other car manufacturers or the products of independent parts and accessories producers, purchased largely from jobbers in the usual manner.

* * *

Consumer Research Among Taxi Drivers

AMATEUR consumer researchers in automobiles will find a fertile field for the practice of their hobby among Washington taxi drivers. The "cabbies" in the nation's capital drive mostly 1934 model, low-priced cars and inasmuch as they roll up mileage four or five times as fast as the average owner, they soon form pretty definite opinions as to what their cars are good for. And a curious customer doesn't find them at all backward about airing not only their experiences with their own cars, but what other drivers tell them about other makes.

We know because last week we spent most of one day taxicabing from one government office to another and, while riding, started up a conversation with each driver on the subject of automobiles and his automobile in particular. It was an interesting pastime although naturally we didn't ride in enough different cabs during the day to justify any very positive conclusions.

Incidentally, one driver registered a complaint against his car because it took too many *different* lubricants to service it.—The Editors.

Pressure Lubrication of Among Features of New P.

Valve gear assembly on crankcase

A NEW series of the Wasp aircraft engine has been placed in production by the Pratt & Whitney Aircraft Co., East Hartford, Conn. While the basic design remains unchanged, refinements have been made throughout the engine.

One of the most important new features is automatic valve lubrication. Valve tappets, rocker bearings, ball ends of push rods and adjustment screws and the valve stems themselves now are all lubricated from the pressure system of the engine, thus doing away with the use of grease in the rocker boxes and the need for periodical servicing. Excess oil in the upper cylinders drains through the pushrod covers into the sump, while from the lower cylinders it passes through an outside manifold secured to the cylinder heads, the cylinders being scavenged by a section of the oil pump. Improved covers are provided for the rocker boxes, secured by means of studs and nuts, and oil-tightness is assured by the use of gaskets.

Radio shielding is of the latest improved type, comprising front and rear manifolds, from each of which there are outlets to the spark plugs and the magneto shields. The front manifold is firmly bolted to the front main crankcase, and the whole assembly is built in sections so that it can be assembled and removed without disturbing other parts.

The joint between the two crankshaft sections now has 31 instead of 16 splines. The shaft also is larger in diameter, and this, together with the increase in the number of splines, has added greatly to its ruggedness.

The valve-operating cam revolves on a bronze bearing of greater surface than in previous models. This bearing is mounted on a shelf inclosed by the forward section of the main crankcase. It is driven by a reduction gear mounted in a bearing at each side, thereby assuring proper alignment. Valve tappets are mounted in guides in the front section of the main crankcase, directly over the cam track. This arrangement reduces the angle between the pushrods and rockers and makes the load on the latter more direct.

In the supercharger the impeller has been strengthened and the floating gear drive improved. The new design, in which the impeller shaft is mounted in three precision-type ball bearings, of which one takes thrust load only, assures a better distribution of tooth load.

The crankcase rear section, a magnesium-alloy casting, supports all engine accessories, including the entire induction system, of which it is a part. Vanes cast on this section tend to produce uniform distribution of the fuel mixture, while vanes in the intake elbow assure even distribution to the impeller. An accelerating pump on the carburetor supplies the charge necessary for starting. This eliminates the usual priming pump and long priming lines, and it is claimed to keep fumes from the primer out of the cockpit and pre-

# of Valve System P. & W. Radials

by P. M. Heldt
Engineering Editor, Autootive Industries

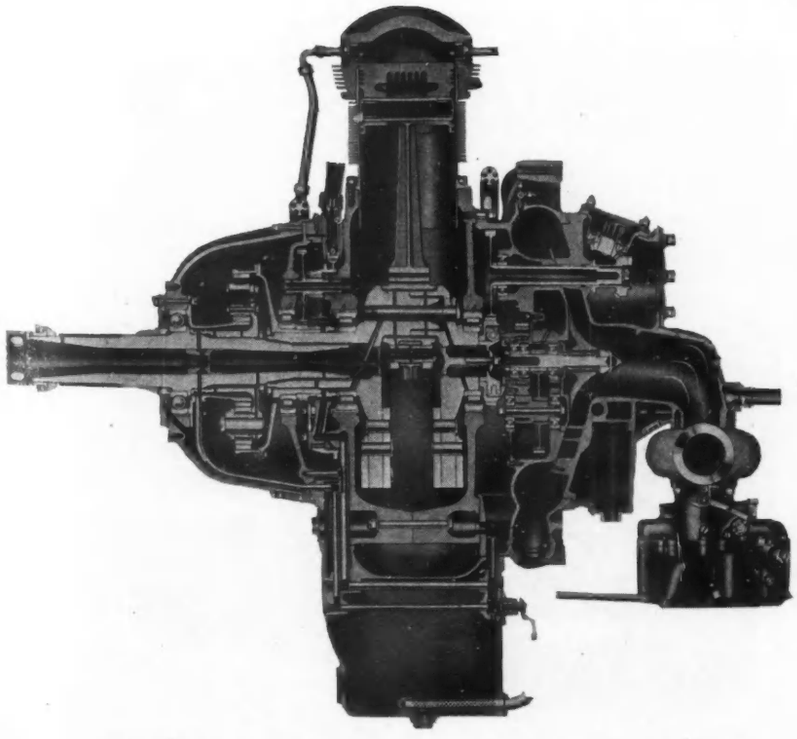
vent flooding and the attendant fire hazard.

In the supercharger-drive clutch there are now six slightly heavier springs instead of the seven formerly used, and the springs bear on a new type of button head which reduces spring wear and assures more nearly uniform stressing of the springs. This clutch limits the stresses which can be imposed on the supercharger drive in the event of high crankshaft acceleration or deceleration.

Some changes have been made in the design of the planetary reduction gear, which is claimed to be considerably simpler but more reliable than previous types.

Fins on the cylinder heads are deeper and more numerous, and the rocker-box covers, which were formerly held in place by a wire bail, are now secured by three studs and nuts each, which improves the oil seal. Rocker shafts have been enlarged and made oil-tight by the use of gaskets. Slots are now cut in the rear spark-plug recesses, to permit of the use of washer-type thermo-couples. Stainless steel liners are shrunk into the exhaust ports, for a slip joint with the exhaust pipes, which eliminates the flanged joint used in all previous models.

The charge diffusor



Section through crankshaft axis of Series H Wasp engine

Pressure baffles are attached to the engine cylinders to assure uniform cooling under severe flight conditions; they are attached in sections, so that any cylinder or group of cylinders can be removed without taking off all of the baffles. Sections between rocker boxes are firmly secured to the cylinders and do not have to be removed for disassembly. Sections between cylinders are fastended by means of butterfly nuts.

Valve rockers of the new model are considerably stronger; they are mounted on double-row ball bearings and drilled for pressure lubrication of the joints. Stellite faces on the valve seats tend to prevent erosion

and warping. Exhaust valves are of the salt-coooled type.

The pistons are machined up of aluminum-alloy forgings and are provided with recesses for both the inlet and the exhaust valves in their flat heads. A compression ratio of 6:1 is used. Piston bosses are considerably stronger than formerly, and ribs cast on the under side of the head keep down its temperature. Each piston carries four compression rings and one oil ring.

Thermostatic control of the oil temperature is provided for. Oil collecting in the sump is either returned directly to the oil tank, located adjacent to the outlet from the sump, or else passed through an oil cooler. When the temperature of the oil in the sump reaches 170 deg. F. the passage to the cooler is opened by the thermostat, and it is closed again when the temperature drops to 155 deg. Flanged connections are used for the oil inlet and outlet, instead of the former threaded connections, to facilitate engine removal.

A new "hot spot" is provided, comprising a stainless steel manifold cast in an aluminum housing through which exhaust gases are passed. This heats the surface completely around the intake passage, as well as the walls of a tube through the center of the passage, which latter is streamlined to reduce its resistance to mixture flow. Because of its compactness, this "hot spot" facilitates the installation of both top and bottom air intakes.

The control mechanism for the Hamilton Standard propeller is now mounted on the rear of the sump, to facilitate installation of cockpit connections. Every effort has been made in this new model to insure oil-tightness. All pipes, accessory covers and cover plates are provided with extra thick flanges with this end in view, and rubber inserts are used on the cylinder flanges and the flanges of the crankcase sections. A one-piece pushrod cover, with packing glands at both ends, replaces the old two-piece cover.

The S1H1-G Wasp, the first of the H Series, is covered by Approved Type Certificate No. 129 and is rated by the manufacturer at 550 hp. at 2200 r.p.m. at 8000-ft. altitude. With a controllable-pitch propeller the output is the same at ground level. Bore and stroke are 5¾ in. each, making the displacement of the nine-cylinder engine 1344 cu. in. A compression ratio of 6 to 1 is used; the propeller gear ratio is 3 to 2, and the blower gear ratio 12 to 1. The bare engine weighs 875 lb. The makers recommend the use of fuel of 87 octane value and give the consumption as 0.48 lb. per hp-hr. when cruising at a maximum of 75 per cent rated power.

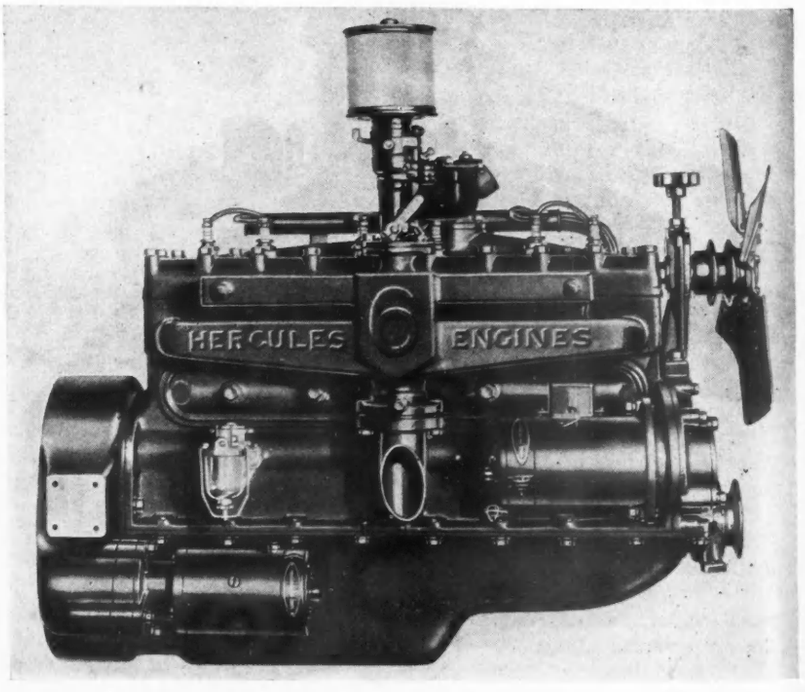
Hercules Model JXD Engine

HERCULES MOTORS CORPORATION, Canton, Ohio, has added a larger-bore model to its JX series of six-cylinder gasoline engines. It is known as the JXD, has cylinder dimensions of 4 by 4¼ in. and a piston displacement of 320 cu. in.

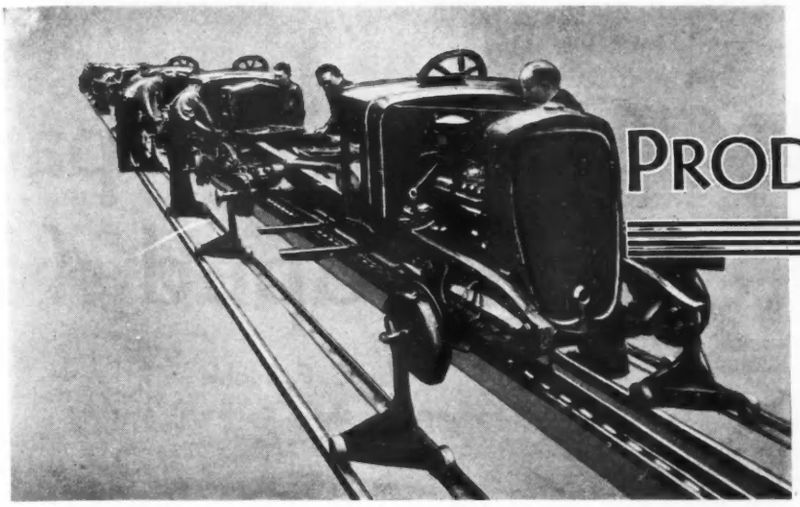
The new engine develops 83.8 hp. at 2800 r.p.m. and 65.5 hp. at 1800 r.p.m. Its maximum torque is 204 lb-ft. at 1000 r.p.m. The 2½-in. chrome-molybdenum crankshaft is supported in seven high-lead bronze bearings of the precision type. The engine block is cast of molybdenum-alloy iron. The engine is of the L-head type and the cylinder head is detachable. Exhaust valves have a clear diameter of 1⅜ in. and inlet valves of 1½ in.

Lubrication is by force feed to all connecting-rod and main bearings, and oil thrown off from the rods lubricates the cylinder walls. Aluminum-alloy pistons are fitted with four rings, all above the piston pins, including one 3/16-in. oil control ring and three ⅛-in. compression rings. All connecting-rod bearings are of the precision type, of high-lead bronze and 2 in. in diameter. Connecting rods have a center-to-center length of 8 in. Either a 1¼ or a 1½-in. carbureter can be installed. A distributor mounting is provided on the left-hand (from flywheel end) side, where the centrifugal water pump is also mounted. A megneto mounting is available as extra equipment.

The JXD is supplied with either No. 3, No. 4 or No. 5 bell housing, as desired, for three-or four-point suspension, and with flywheels for any type of clutch.



Hercules Model JXD six-cylinder gasoline engine



PRODUCTION LINES

Economics Revised

Under NRA codes, one of the most attractive features of decentralization of industry—lower labor rates—has been completely wiped out. Here is a real problem confronting many small industries located in communities off the beaten industrial track. If these manufacturers are to remain in business they must put their house in order immediately. It requires planning, reorganization of plant activity, and the installation of modern equipment. Nothing less will do.

Old Order

How not to buy production equipment is illustrated by the experience of two of our friends who recently took hold of plants in widely separated parts of the country. Each one found a large number of machines on the floor that had never been used, although purchased five or six years ago. These machines are now just as obsolete and useless as if they had been worn out. We hope that the original purchase was only a matter of error in judgment.

Truck Finish

Synthetic resin finishes seem to have made their mark on commercial bodies both in production and refinishing. Two types of finishes are available — air drying synthetic enamels and baking synthetic enamels. The first is best suited to fleet work and refinishing shops where production facilities and volume are limited; the latter makes a real production set-up where volume warrants investment in drying equipment. Popularity of the synthetic finish rests with its lower cost and great durability.

Real Economy

In recent correspondence, Chief Engineer Oetzel of the Atlas Imperial Diesel Engine Co. reports concerning the results of his recent trip in an International truck equipped with the Atlas Diesel conversion unit. The average weight of the vehicle was 15,000 pounds gross. For a trip of about 8000 miles they averaged a fuel economy of 11.3 miles per gallon, on fuel oil of course.

Duozinc Coat

Plating with Duozinc, an alloy of zinc and mercury, is the subject of an instructive manual recently issued by DuPont. As we get it, Duozinc is recommended for plating steel parts such as rims, tire chains, radio parts, etc., and produces a coating possessing a high order of resistance to atmospheric corrosion. Mercury content aids in forming fine-grained deposits and also improves throwing power of the plating bath. This manual includes all instructions needed by the practical plater. It's free for the asking.

Short Turns

According to the humor column of a recent issue of S.E.P., the difference between a fortune teller and an economist is that many people believe the economist.

Arbitration

New York City's big office buildings settled a walkout of elevator operators and service employees a few days ago. It was a simple case of collective bargaining. If you, as a worker in the building, used an elevator you were carried out on a stretcher. If you were an elevator runner and not a union man, well—At any rate the building operators capitulated and another labor victory won.

Radio Technique

We are a radio fan only in a modest way. But we are glad to record that of all the programs we hear, those few originating with auto makers are the most restrained in the way of personal advertising. Which is good business since most people are pretty well fed up on the stuff that comes over the ether. Good programs and good taste are making friends for the automobile on the air.

Guaranteed

A prominent machinery manufacturer has gone far this year with a special policy, not new perhaps, but on a bigger scale. This company contracts to tool up an entire line with their own equipment. And then guarantees productivity and cost.

Of Genesis

An absorbing story of the birth of synthetic abrasive materials is told in an attractive brochure by Norton. It gives the background of Alundum and Crystolon abrasives—how made, how used, how controlled. You'll be interested.—J. G.

MANUFACTURING MANAGEMENT METALLURGY

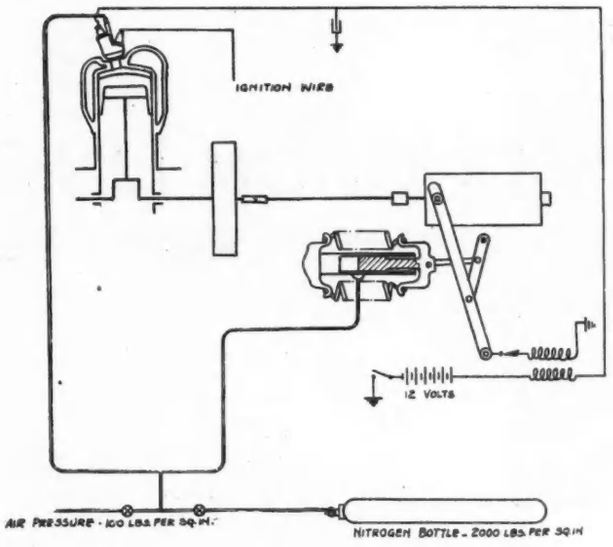


Fig. 1—Diagram of Farnboro indicator

Combined Spark P Developed for U

by C. F. Bachle

Experimental Engineer, Continental Aircraft Engine Co.

THE Continental Motors Corporation Research Testing Laboratory has, for the past several years, been developing an indicator valve of the Farnboro type. The main objective at the start of this development was to obtain a valve in combination with a spark plug which would fit in the ordinary 18 mm. spark plug clearance space. This objective has been achieved and other improvements have been effected during the course of the development.

The principle on which the Farnboro indicator works consists in balancing the cylinder pressure, by means of gas pressure, on a small disc valve near the cylinder walls. This balancing pressure also acts on a piston whose motion is restrained by springs. The motion of the piston is transmitted by a link to a pointer which moves parallel to the axis of a drum rotating in time with the engine. The position of the pointer indicates the balancing pressure. The disc acts as a circuit breaker in the primary circuit of an induction coil, and induces a high tension spark at the instant the disc is lifted from its seat. This spark, in its path from the pointer to the drum, perforates a sheet of paper which is rotated on the drum. The balance points are obtained for each cycle, one on the up-stroke and one on the down-stroke, and the card is progressively built up as the pointer moves parallel to the axis of the drum. Fig. 1 shows a diagrammatic sketch of the apparatus. The standard Farnboro valve will not go into the clearance space of an 18 mm. spark plug when the plug is recessed and, moreover, on cylinders having one spark plug it is difficult or impossible to connect the valve without major alterations to the engine. The present valve was developed to circumvent these difficulties.

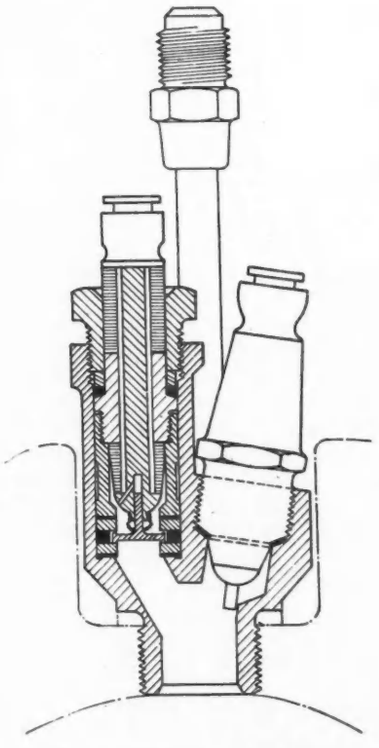


Fig. 2—Combined indicator valve and spark plug in section

The valve uses a standard mica-type insulator from a standard mica spark plug for the spark plug part and another spark plug mica insulator re-machined for the insulator of the valve. The spark for ignition passes between the electrodes and the body of the valve, no side wire being necessary. The valve itself is 5/16 in. in diameter and has a raised rim on each side, 0.007 in. high and 0.007 in. wide. The valve seats on stellite washers, which are spaced by a copper spacer, so as to allow the valve about 0.005 in. movement. A close-fitting copper gasket, which rests on a conical seat and expands by pressure from the hollow screw, seals the insulator end of the valve against gas leakage. The balancing pressure is led to the space above the valve through a steel tube brazed to the body and through holes in the spacer beneath the insulator.

One of the most troublesome problems was to insure a good electrical connection between the valve and the insulator. This was satisfactorily provided by a steel spring made of 0.010 in. diameter piano wire wound so that the coils are 0.007 in. smaller than the stem of the valve and of the insulator electrode. The gripping action thus provided is sufficient to maintain good contact even though the wire loses its temper in operation. The valve stem guide is vented to eliminate any pumping action when oil is trapped above the valve stem.

It was found that the valve seats would last much longer if the current was limited to less than one ampere. A satisfactory spark will result from this current when used with an ordinary ignition spark coil. From consideration of the ordinary

Plug and Indicator Valve Use with Farnboro Instrument

decay formula for an electric circuit having resistance and inductance—

$$I = \frac{E}{R}(1-e^{\frac{Rt}{L}})$$

it will be seen that if the current is held constant and E and R are increased, t will become smaller. Since R is the sum of the resistance of the coil and the external resistance, in order to make the electrical action faster, it is only necessary to increase the voltage and the external resistance until the speed is adequate. The practical limit on voltage with an ordinary ignition spark coil is about 40 volts. At this voltage a spark will occur on the make as well as on the break. For ordinary cards from the combustion chamber, 12 volts is sufficient. When taking cards on the intake pipe, where the pressure waves may be of fairly high frequency, a higher voltage may be necessary.

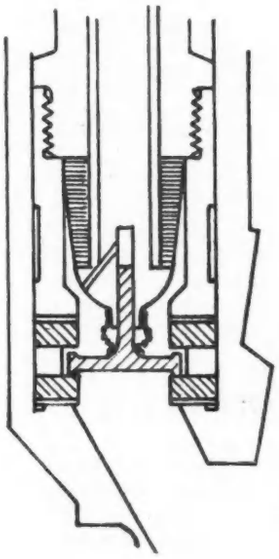


Fig 3—Indicator valve in section

In order to decrease the time required for the valve to move from one seat to the other, it is necessary to reduce the ratio of inertia of the valve to the force available to move it. This may be expressed by the ratio of weight of the valve to the area exposed to the gas pressures. It is apparent that with two geometrically similar valves, one half the size of the other, the smaller will have a much more favorable ratio of weight to area exposed to the gas pressure. In the standard Farnboro valve, which is of ½-in. diameter, this ratio is 0.0261 lb. per sq. in. of valve area. This figure for the 5/16-in. diameter spark plug indicator valve is 0.0132. Likewise, the valve seat area error of the Farnboro is 32.2 per cent, whereas in the spark-plug indicator the valve seat area error is 10.2 per cent. Actually the two valves will show the same pressures in spite of the difference in the valve seat area error. It is thought that the valve does not make contact over the full width of the seat, but rather along a line, in which case the error would be zero. Many checks have been made which show that the valve seat error is not encountered in operation.

If the upper side of the valve has atmospheric pressure, the valve may never contact the lower seat, but always rest on the upper seat, and this is especially true in supercharged engines. In operation, between times when cards are taken, it is necessary to maintain about 100 lb. per sq. in. pressure on the upper side of the valve. The valve will then rest on each seat for about an equal length of time during each cycle, thus keeping each seat clean. In order to conserve nitrogen, air from the factory line is connected, between taking cards. When the valve is used on an air-cooled cylinder it is not necessary to provide cooling; however, when used on liquid-cooled engines of more than 150 I.M.E.P., it is desirable to cool the valve. This is accomplished by an air jet from a ¼-in. copper tube directed at the lower part of the body. For ordinary unsupercharged, liquid-cooled engines, it has been found unnecessary to cool the valves. Cards have been taken on air-cooled cylinders with as high as 250 I.M.E.P. and on Prestone-cooled (250 deg.) cylinders as high as 300 I.M.E.P. where the maximum pressure was about 1000 lb. per sq. in. No trouble from the spark plug part of the valve has been experienced under these conditions. One valve has been used for about 250 cards of about 110 I.M.E.P. over a period of a year without being disassembled or serviced in any way. On higher output cylinders, it is desirable to renew the valve after about 50 cards. Valves made of various materials have been tried and found to work

Fig. 4—Combined spark plug and indicator valve

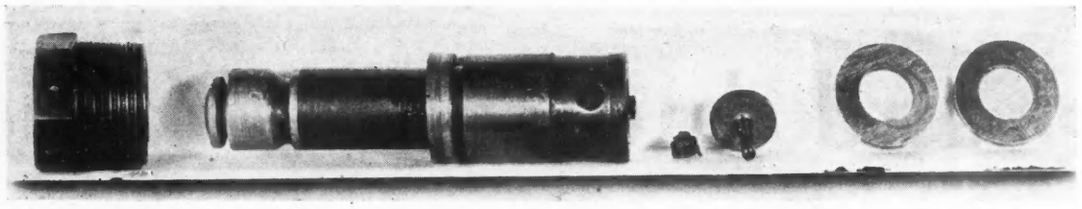


Fig. 5—Indicator-Valve parts (unit insulator, spring, valve and Stellite valve seats)

well with nearly any steel, as far as wearing of the seat goes. However, it is necessary to provide a high strength material for high pressure cards to prevent the valve stem from breaking off at the valve disc. SAE 3140 steel, heat-treated to 250 Brinell, has been found satisfactory for the valve.

Most of the engines used in the laboratory have an auxiliary spark coil, the primary current of which is interrupted by the same breakers as used for firing the engine. The spark from the auxiliary coil is caused to jump from a projection on the flywheel rim to a quadrant, which indicates the spark advance. This same spark may be caused to perforate the paper of the indicator card, thus indicating the spark advance directly on the card. All other time events in the cycle may be drawn on the card from this point.

Satisfactory cards have been taken on combustion chambers at speeds between 300 r.p.m. and 3700 r.p.m. and on intake pipes having surges with pressure peaks 0.0017 sec. apart.

Data on Free Machining Stainless Steel

IN a new issue of the Ludlum Steel Company's Blue Sheet bulletin describing various stainless steel grades as well as tool and die steels, are two data sheets giving complete details of the two principal grades of Ludlum free-machining stainless materials—Silcrome 12EZ and Silcrome KA2-EZ. A brief description of these grades will serve to round out the comprehensive discussion of machineable stainless steels published in *Automotive Industries* May 19, 1934.

Silcrome 12EZ is a free-machining modification of Silcrome 12, a stainless steel recommended for applications requiring moderate corrosion resistance and high physical properties developed by heat treatment. Both materials are machineable but Silcrome 12EZ is recommended for very rapid machining. With Silcrome 12-EZ a surface speed of 90-120 ft. per minute can be secured. In drilling, the use of a drill with fairly flat angles is recommended, and the speed should be about one-half of that used on mild steel. Taps should be used which have a maximum number of flutes.

Silcrome KA2-EZ is the free-machining modification of the Silcrome KA2 material of the 18-8 variety. These grades are of the normal carbon type most resistant to general corrosive attack and retaining good physical properties at elevated temperatures. Being an austenitic alloy, Silcrome KA2 is more difficult to machine than ordinary mild steel. Best results are obtained with bars having a hardness of about 195 to 240 Brinell, and by using a slow cutting speed of about 35 to 45 surface feet per minute with moderately heavy cuts.

This speed can be increased to 60 to 80 feet per minute with the free cutting type—Silcrome KA2-EZ. Tools should be ground very sharp and kept sharp with a steel lip and side rake of at least 15 degrees. For lubricant use lard oil with sulphur, about 1 lb. of sulphur to each gallon of oil.

The table given here shows the typical chemical analysis of the two machineable grades described above. Note that the modifying element in Silcrome 12-EZ is molybdenum; in Silcrome KA2-EZ, selenium.

Typical Analyses

	Silcrome 12-EZ	Silcrome KA2-EZ
Carbon	.12	.19
Manganese	.50	.38
Silicon	.30	.66
Chromium	12.00	18.00
Nickel	..	9.00
Phosphorus	.030	.020
Sulphur	.30	.012
Molybdenum	.50	..
Selenium	..	.27

Objection Based on Error

ONE objection that at times has been made against stainless steels is their reputed lack of ductility at high temperatures. H. D. Newell, chief metallurgist of the Babcock & Wilcox Co., in an A.S.M. paper. "The Ductility of Chromium-Nickel Austenitic Steels at Elevated Temperatures," makes the statement that this objection is based on an error and that, as a matter of fact, such steels remain extremely tough when hot and are fully capable of resisting shock under severe service conditions.

A study was made of a number of experimental and commercial austenitic alloy steels. Alterations of the usual compositions and addition of moderate amounts of special elements were made, and the resulting alloys were subjected to short-time tensile tests at temperatures extending into the reduced-ductility range.

Addition elements tending to form ferrite show a tendency to improve hot ductility, but not to the same extent. Elements which have deoxidation power and grain refining action are more potent than those which simply form ferrite and stiffen the matrix. On the other hand, silicon increases ductility at the higher temperatures in the absence of ferrite.

It has been shown that titanium increases ductility, possibly first through deoxidation and grain refinement and finally through ferrite formation. A similar trend is shown for molybdenum and to a much lesser extent for vanadium. Columbian, in spite of its similar action to titanium in preventing intercrystalline corrosion effects, does not improve ductility. Conversely, reduction of nickel content, to the extent that ferrite is formed, improves ductility.